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The supply of and demand for EC business information in the United Kingdom

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Paper presented at the Fourth Dawson's Research Seminar, held at Loughborough University of Technology on 18 September 1991.

My intention this morning is to start the day's proceedings with a general overview of supply and demand as it relates to the business use of European Communities (EC) information in the United Kingdom. I will divide my paper into three main parts. I will look first at the nature of business demand for EC information, then at the sources from which demand is satisfied, and finally conclude with some observations on the match between supply and demand. In the time available I can do little more than sketch the principal characteristics of information provision, but by so doing I hope to provide something of a background and context against which to consider the more specialist papers which follow during the remainder of the day. I should also say that I use the phrase 'EC information' rather loosely as a convenient short-hand expression to describe any kind of information by or about the EC which members of the business community might reasonably require in the conduct of their business activities.

I should perhaps also preface my remarks by saying that my paper is not entirely a figment of my imagination. Much of it derives, in fact, from an unpublished report I prepared for the Commission of the European Communities on user needs and profiles[1] and to a lesser degree from a previous report for the British Library on the business use of EC information[2], supplemented by more recent personal observation.

1. Demand for EC information

It would be naive to assume that even as we approach the magical year of 1992 every businessman is thirsting for information on the EC or that there is a constant and consistent demand for EC information across the whole of the business sector. In fact, despite the media hype surrounding the single market campaign, the level of interest in and demand for EC information is very much determined by the extent to which the industrial and commercial activities of individual companies are affected by the EC. Generally speaking, the larger the company the more its business operations are likely to be affected by EC membership and the more likely it is to have the inclination and the resources to acquire and use EC information. Companies which conduct large-scale business operations across national boundaries and do business in markets which are international rather than domestic recognize the relevance of the EC to their long-term well-being and the consequent need to be informed on matters that affect company performance and profitability. They recognize the importance of having a continuous source of good intelligence on EC developments and make arrangements to monitor current events and to provide senior managers with a regular supply of information and analyses.

However, many business managers are not information-oriented and do not generally recognize the need to allocate time during their busy work schedules for keeping up to date with developments in the EC. This attitude is particularly prevalent in the small and medium-sized enterprises (SME) sector, where the EC is rarely perceived to have a major influence over day-to-day business affairs and where many enterprises are managed by business people whose markets are local and who are concerned more with short-term survival than with long-term expansion into overseas markets.

The nature of business demand can be illustrated by reference to *Figure 1* which distinguishes three horizontal layers of demand for EC information based on the degree to which the EC impinges upon business affairs.

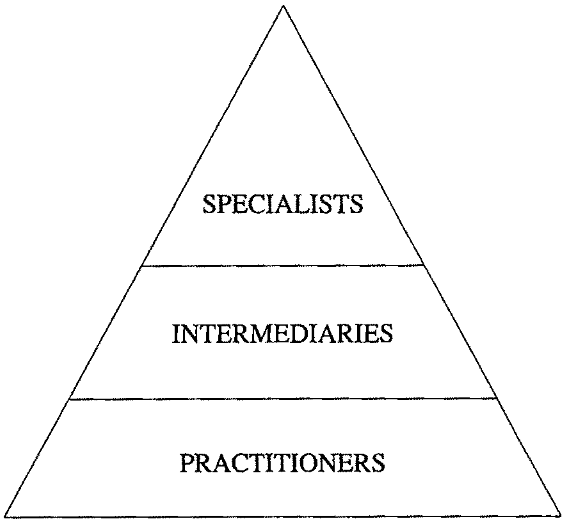

Figure 1: Business demand for EC information

The model has a broad base representing the majority of the business population who have only in frequent contact with the EC and consequently only spasmodic and general need for information on EC affairs. As one progresses up the pyramid so the size of the user population decreases and the level of EC impact increases, demand becomes both more frequent and

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more refined and expectations of EC information services more exacting.

1.1 Specialists

The apex of the pyramid is occupied by specialists whose day-to-day work brings them into constant contact with the EC and whose job specifications often include monitoring EC affairs on behalf of their parent organizations. In the business sector specialists of this kind usually work in large companies whose commercial operations are international and whose corporate affairs are significantly affected by Community law; they often have job titles which refer to them as corporate, public or external affairs advisers or European liaison officers. Also included in this category would be EC specialists who work in the many advisory, consultancy and support services associated with business, particularly the legal, management and financial professions. However, EC specialists are also to be found in other large organizations such as professional federations eg. the CBI and the Institute of Directors or national administrations and local government circles.

Without information the work of such "Euro-watchers" would be impossible; it is the essential ingredient that determines the quality of the services they are able to provide, be they informing senior company management of the latest legislative proposals or advising clients on the best ways to make a grant application. Consequently, staff employed in this capacity recognize the value of good channels of communication, are usually well-informed and very familiar with the informal as well as conventional — including printed sources of information. It should also be noted that they are often more concerned with legislation in the pipeline – required for the purpose of lobbying and influencing the formulation of policy – than with already enacted legislation.

1.2 Intermediaries

Intermediaries consist of a diverse group of organizations and individuals that stand between the EC and the end-user, gathering, using and disseminating information of potential interest to their members, customers and clients. In the business sector they include trade and employers' associations, chambers of commerce, trade unions and specialist information services as well as business advisory services such as banks, accountancies, legal firms and management consultancies.

Intermediary organizations reveal wide variations in the priority they attach to EC affairs and their consequent ability to provide good quality information services to their members. In some cases, they have individuals who are as highly motivated and as well informed as the specialists mentioned above. In other cases, however, where the EC is treated as just one of a number of areas of concern, they display a lower level of familiarity with EC affairs and with sources of EC information.

1.3 Practitioners

Practitioners are those individuals whose need for EC information occurs in an operational or practical environment associated with their occupation or work. The majority of business persons fall into this category, although it should be said that the EC exerts little direct influence over the working lives of many practitioners, particularly those operating in the SME sector, many of whom are not naturally information-oriented and are not prepared to spend time and money on its systematic acquisition and use. When a need for EC information arises it is often problem-oriented, product-related and short-lived. Demand arises unexpectedly, requires to be satisfied quickly and then subsides just as rapidly. Unlike EC specialists, practitioners are more often concerned with the application of already enacted legislation than with legislative proposals currently in the pipe-line and expect others, particularly the trade and professional bodies to which they belong, to provide them with the necessary information and assistance.

2. Sources of EC information

Let's look now at the response to demand in the United Kingdom. The first thing to say is that there is no shortage of information on the EC. In fact, the reverse is true. The difficulty rests in sorting out the wheat from the chaff and finding information written and presented in a form which is intelligible to the recipient. The second is that business managers rely heavily on personal contact and other informal channels of communication for finding out about and transmitting EC information. Specialist Euro watchers spend much of their time nurturing and extending their range of contacts with the key officials in Community institutions, government departments, business and professional organizations; intermediaries obtain much of their intelligence from direct contact with EC and government officials on joint working parties, committees and other representative bodies; practitioners glean information from conversations with business colleagues and competitors, and from their membership of professional and trade associations.

However, in addition to informal information exchange it is possible to identify several principal sources of information of relevance to the business community, as illustrated in *Figure 2*, which shows sources of primary information at the apex and secondary information at the base.

2.1 Commercial publishers

Although it is sometimes said that business managers do not read, printed publications – and their electronic equivalents where they exist – do play an important role in providing companies with EC information. Such has been the success of the campaign to raise levels of public awareness on 1992 and related issues that there has been an explosion of demand for EC information followed by a predictable market response

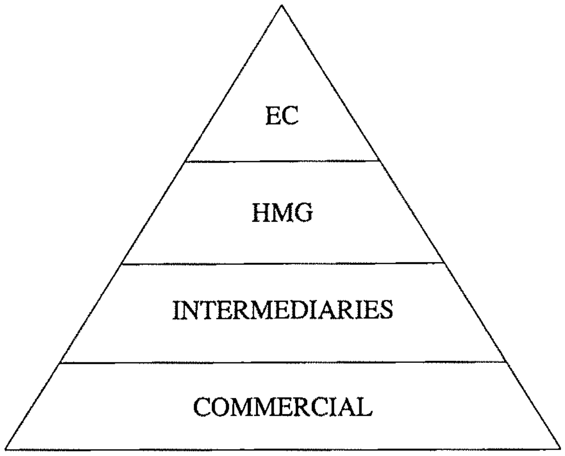

Figure 2: Sources of EC information

in the form of specialists of many kinds peddling books, newsletters, databases and a variety of information and consultancy services, some of which make impressive claims to justify their inflated prices but which are in reality of dubious quality and provenance. Nevertheless, there has been a noticeable increase in the number of useful reference books and computer-based services aimed specifically at the business sector, many of which seek to provide manufacturers and exporters with the kind of practical information and statistical data they require to exploit the opportunities afforded by the single internal market.

2.2 Intermediary organizations

Trade associations, employers associations, chambers of commerce, management consultants, accountancies, banks and other financial institutions, all attempt to monitor EC developments to a greater or lesser degree and to alert their customers, clients and members of developments, policy initiatives and legislation which might affect their business activities and profitability. As such they are extremely important sources of business information on Europe. The information services they can provide include informative newsletters and bulletins which highlight and analyse the latest business developments, more substantial reference sources, specialist database services, SDI services tailored to individual needs, sometimes associated with lobbying and other representational activities. In order to enhance the quality of the information they receive, many intermediaries have direct channels of communication with Brussels, either through the creation of listening posts in Brussels or through participation in the work of European-level associations.

In terms of the information services they provide there would appear to be a marked difference between, on the one-hand, representative organizations such as chambers of commerce and trade associations and, on the other hand, professional and private organizations such as banks, accountancies, management consultants and legal firms. The former project a somewhat passive image and tailor their services to the collective needs of a broad membership; they treat the EC as but one of many topics to be covered and they offer services which are of a reactive kind. The latter, on the other hand, offer services which are much more client-oriented, more specifically targeted on the EC and whose object is to anticipate events and provide clients with early warning of impending actions. Moreover, the range of services provided by representative organizations is often determined by what their budgets can afford; the services offered by professional and private organizations are determined by what their clients budgets can afford.

2.3 Her Majesty's Government (HMG)

Government departments constitute another important source of information on EC affairs. Through their extensive contacts with representative business organizations – both formal and informal – they provide early warning of impending legislative changes and detailed information on the translation of EC directives into UK law. Important new legislative proposals received from the Commission are often circulated for guidance and advice and consultative documents are also widely distributed when the opinion of industry is required on how best to implement major business directives. Moreover, government departments also provide a great deal of additional information on EC topics which fall within their departmental briefs. In this respect, as the lead department in relation to the single market campaign and other areas of business concern, the DTI is easily the most important government department for the business sector. As you must know, the DTI has spearheaded a high profile media campaign to alert British business to the challenges and opportunities of the single internal market. As part of this campaign it has produced a wealth of information, which is disseminated through newsletters, booklets, guides, databases, videos and many other promotional activities.

2.4 EC institutions

The EC itself is, of course, the principal source of primary information on EC affairs. EC institutions generate a tremendous amount of documentation during the course of a legislative process which gives each major institution a part to play and which necessitates constant interaction and communication between them, usually in the form of printed documents. As an international organization, one of whose principal aims is to bring common standards and levels of provision to bear in a wide range of socio-economic fields, the EC requires a tremendous amount of statistical and other comparative data on the current situation in each member country in order to anticipate the implications of policy decisions or to monitor the impact of decisions already taken. As an organization financed from public funds the EC recognizes that much of this information has potential value outside the organization, particularly in the business and commercial world. Consequently, a great deal is published either conventionally or made available in computer-based form.

2.4.1 Information policy

However, over and above this the EC recognizes that without the support of the people of Europe for its policies and actions the ideals embodied in the original Treaty of Rome cannot be achieved. Consequently, the Commission has an information policy which is designed to ensure that information about the aims, activities and achievements of the EC is available at the right level and in the right format to service the needs of a wide variety of EC information users.

In broad terms the EC seeks to achieve its information policy by means of targeting groups of "opinion multipliers", by aiming its information services and campaigns at sectors of the community which are deemed to be particularly influential in shaping public opinion. The media in all its various representations is an obvious and very important target group; others include the teaching profession, trade unionists, consumer groups. In the last couple of years the business community has been a principal target audience–particularly SMEs, with information on the completion of the single internal market as the priority focus. Numerous publications have been issued on various aspects of the subject, many aimed specifically at the business market; specialized databases have been developed on single market legislation and a range of promotional means used to draw business attention to single market issues.

The information and enquiry services provided by EC offices in member states play a key role in the implementation of information policy. In the United Kingdom, the Commission has offices in London, Cardiff, Belfast and Edinburgh, which have libraries, documentation, databases and expert staff able to deal with information enquiries on EC affairs. However, such is the limited nature of its resources that the Commission it unable to cope with the volume of demand for EC information, particularly in relation to 1992. Consequently, it is currently attempting to introduce a concept of decentralized information provision by which the EC offices become centres of last resort rather than first as they often are now. The idea is to create networks of information relays which can multiply and disseminate the information provided by the EC in a much more effective and meaningful way than can be done by the EC itself. European Documentation Centres are longstanding examples in the academic sector. Euro Info Centres have become the principal relay network in the business sector, something about which you will hear later in the day.

3. The match between supply and demand

In conclusion, I would say that despite the major improvements stimulated by 1992 in levels of general awareness and in the publication of specialist information tools there remains an imbalance between supply and demand in the United Kingdom. Despite a great deal of human effort and the investment of substantial resources, there is clear evidence to suggest that the needs of those for whom information services and products are so expensively produced are not being entirely satisfied. On the one hand, Community institutions and their constituent departments generate more and more information, whilst on the other hand there remains, paradoxically, a distinct feeling amongst some users that they are deprived of information or are unable to obtain it in the form and at the time when required.

It is abundantly clear that there is no shortage of EC information; in fact, a root cause of many of the problems experienced by users is the sheer volume of material available and the inability of the present bibliographic and information infrastructure to manage it in such a way as to provide ready access to relevant information when demand arises. I will highlight just two ways in which the situation can be improved: first, better co-ordination of existing information resources and services, and secondly, better targeting of existing resources.

3.1 Co-ordination

Better co-ordination of EC information services available to the business community is necessary to avoid duplication of effort, to create a national framework within which information providers can operate and to ensure that business enquiries addressed to one link in the chain can be satisfied by another if the resources of the former are inadequate. Separate components of the existing infrastructure work largely in isolation; their closer collaboration would strengthen the system and would make a substantial body of expertise and documentation available to a larger audience. One has only to look at the separate way in which the Euro Info Centre network was established by DG XXIII (as now is) with no reference to the very similar network of European Documentation Centres (EDCs) established many years before by DG X, to see how much scope there is for better co-ordination of effort and use of resources.

However, efforts are being made to improve co-ordination at a number of levels as two examples illustrate. First, on a national level the former Association of EDC Librarians has recently transformed itself into the European Information Association (EIA) in recognition of the need to provide a forum for EC information providers from a wide variety of backgrounds to share and learn from each other's experience. On a local level, initiatives have been taken within the context of the Leicestershire Library and Information Plan (LIP), to create a forum within which local EC information providers can pool expertise and resources in order to provide information seekers, including the business community, with a more effective service.

3.2 Targeting

Specialists, intermediaries and business practitioners express little enthusiasm for receiving large amounts of information of a general kind about the EC and are not inclined to spend time, effort and money monitoring sources such as the *Official Journal of the European Communities* or *COM* documents when their sheer size and scope overwhelm the majority of users and make it very difficult for them to identify the relatively small amounts of information which are relevant to their needs.

What business users do need are information tools which inform them about those matters – and only those matters – which are relevant to their own business activities. In very general terms, this means information on i) the legislative framework which governs the conduct of business activity in the EC, ii) economic and commercial data on markets and business conditions in other member countries and iii) the sources of financial support and assistance available through EC membership. In relation to Community law, they not only require detailed guidance on the numerous specific measures taken within the context of the 1992 initiative to eliminate physical, technical and fiscal barriers but also upon the application of Community law in different member countries. In respect of economic and commercial information there would appear to be a need for exporters and traders to have improved access to up-to-date and detailed commercial information on market conditions in member countries and on the legal provisions with which they have to comply if they wish to do business in those countries. As regards financial information, they clearly want information on what grants, loans and other financial schemes exist and practical assistance on how to obtain such funds.

There is a clear need, in fact, for the Commission to identify key target groups, to create profiles of their information needs and to use the powerful opportunities of information technology to produce information tools in a variety of media and formats designed specifically to cater for their special interests. With skilful selection and professional editing additional information tools could be produced whose contents match defined user requirements and which are much more user-friendly than the general sources currently available.

More effective co-ordination of the considerable expertise and numerous sources of EC information available in the United Kingdom, combined with a more focused EC policy on information provision would go a long way to ensuring that British business has the information and intelligence it needs to make a success of the single market.

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European Information Centres & EC enterprise policy

Mike Coyne

Paper presented at the Fourth Dawson's Research Seminar, held at Loughborough University of Technology on 18 September 1991.

Many of the European Information Centres have barely been operating for a full year, but it is already clear that the EICs have developed a style of operation and a momentum that is making a distinctive contribution to the process of communicating information about the dramatic changes taking place within the European Community.

The aim of this paper is to provide information on some of the interesting developments occurring within the EIC network, but as the title suggests, it is also intended to offer a perspective on these developments by placing them in the context of the European Community's Enterprise Policy. The EIC project was established as one of the major instruments of this policy and the continuation and elaboration of the system will largely depend upon a judgement of how well the EICs are contributing to the achievement of the objectives central to it. This context is important, therefore, in explaining both the initial formation of the system and the current operational practices of individual EICs. The paper will use it as a basis for commenting on some of the characteristics of the EIC project and for examining the idea that with the EICs we are seeing in the field of European information provision, not exactly a clash of cultures, but certainly an interesting interaction between information professionals and the EIC staff who come from a variety of disciplinary backgrounds.

The basic function of an EIC is to provide information on European Community matters to businesses and especially small and medium sized enterprises (SMEs). The definition of SMEs in this context is independent concerns with up to 500 employees and net fixed assets of less than ECU 75 million. Some SMEs are therefore quite substantial organizations, but it is still the case that the EICs are mainly addressing an audience which has not traditionally made use of formal systems of information provision. On the contrary, with the exception of advice from accountants and bank managers, most of the information used by firms of this type has been derived informally and is often very local in its scope. The pace of change and the scale of the single European market in which these firms now have to operate are such that the informal means will no longer suffice. What is more, it is difficult to see how, in the absence of supportive measures, SMEs could easily adjust to the new situation. The area of information provision is one in which there are significant market failures, which arise from the possibility of adverse selection and the nature of information as a public good. This means that there are obstacles to a market solution to this problem and some form of public response is required. It was partially the recognition of this situation that led the European Commission to formulate an enterprise policy and to allow a major role for information provision within it (CEC 1989). However it has to be appreciated that the information provision schemes in the enterprise policy form part of a much broader picture. Information provision is only one element in a policy to mobilize the SME sector at a European level.

The origins of this policy lie in reappraisal of the economic significance of the small firm sector that took place in the late 1970s and early 1980s. SMEs were increasingly seen as playing an important role in stimulating innovation and flexibility in the economy, especially in those Member States that had previously disregarded the sector. In March 1985 the European Council registered its approval of the promotion of small businesses and in August of the next year this gave rise to the SME Action Plan (CEC 1986), which already envisaged the pilot phase of EIC establishment (39 offices in total) operating alongside a series of other initiatives. The elaboration of this plan into an enterprise policy, including the establishment of a network of 187 (now 211) EICs across the Community, was presented by the Commission in August 1989. Here the provision of information was set alongside other measures to promote the SME sector, including addressing legal and administrative constraints on business, schemes to deal with deficiencies in financial markets, the promotion of business co-operation and various forms of training. By this time the prospect of the Single Market was adding urgency to the whole process, but it was made clear that the objective was not simply to ensure that SMEs could effectively participate in the internal market. It was also intended that 'by using the enterprise sector to an important degree as an intermediary' other EC policies should be pursued in the area of scientific and technological development and of ensuring economic and social cohesion. (CEC 1989)

The EICs' informational role, then, should be seen as part of a policy package. Cross-fertilization and interaction between the elements of this package was a fairly obvious consequence. It was further encouraged by other characteristics of the policy enshrined in its 'guiding principles'. For instance, it was proposed that 'wherever possible, existing structures should be used to implement Community policies and the creation of new bodies avoided' and that 'action should recognize the wide range of institutional and cultural structures in the Community...' (CEC 1989) As a result, when it came to establishing the EIC network, bids were invited from a range of existing organizations and a wide variety of host structures was finally selected.

In the UK hosts selected included Chambers of Commerce, local authorities' organizations, development agencies and higher education institutions. (Coyne 1991) Across the Community the range of host organizations was even more diverse; in Germany, for example, there were technology transfer organizations, banks and national bodies, such as the DIN standards office.

The EICs, then, work in and through their host organizations and in a situation where there is considerable diversity in the nature, scale and functions of these organizations it was to be expected that there would be some differences in the operational characteristics of individual EICs. The Commission, or more specifically DGXXIII, the sponsoring Directorate General, ensures that there is a common core of services provided by all EICs, but there are interesting differences in the subsidiary functions that they perform. So, in addition to the range of activities undertaken by EICs as a consequence of their genesis in EC Enterprise policy, there is a further set that vary with the particular form of the host structure.

To be specific, the basic functions performed by all EICs are:

i) to provide detailed information, primarily for SMEs, about the Single Market programme and other major developments in the European Community
ii) to promote awareness in their local business community of the significance of these developments, through the media and other means of communication
iii) to assist firms and other organizations, but again especially SMEs, to participate in EC R & D programmes and in tendering for public contracts in other members states
iv) to act as a channel of information and intelligence to the Commission about local concerns and conditions and particularly about problems that arise for SMEs from the operation of EC policy

Most EICs also provide a Business Co-operation service. That is, they assist SMEs in finding partner organizations in other member states, to co-operate in a whole range of business activities, from becoming subcontractors or suppliers to developing joint marketing or research activities or arranging mergers or take-overs. Many perform this function as formally registered BC-Net agents. Most also make use of the electronic mail system through which they can communicate to all or any subset of the EIC network.

Even in their central activities, therefore, EICs go well beyond offering an information service. They provide advice and various forms of consultancy and they may become involved in certain aspects of training. When it comes to the services that owe a lot to the nature of the host organization, there are further elaborations of their basic function in the UK, where a number of EICs are located in Chambers of Commerce, there is often a reflection of the traditional strength of the Chambers in providing support to exporters in the form of expertise in export documentation and in advice and support for firms participation in trade delegations or trade fairs. Elsewhere where host organizations have a responsibility for promoting inward investment, the EIC can include this amongst its activities. In other parts of the EC there are some EICs that offer what is essentially legal advice or consultancy in financial matters. Others promote particular sectoral interests, for example the "craft" sector, in the sense of the "artisanisat" or 'handwerk', while some play a role within national organizations, such as the Italian employers association, Confidustria.

It would be wrong, however, to suggest that the potential for diversity within the system is explosive. There are some important constraints on the variety within it. The first brings us back to the framework of EC Enterprise Policy within which the EICs have to operate, but there are also important resource and financial constraints which have tended to bring about certain specific developments.

The Enterprise Policy for which DGXXIII has prime responsibility does set out a fairly clear set of objectives and while these may introduce the requirement for some diversity in the form of the services provided it also sets certain limits which have their formal expression in the contractual relationship between DGXXIII and the host organization. The EICs are obliged to be non profit-making, to provide certain types of information for free, to participate in a monitoring system and to become involved in certain events organized by Brussels. They are also encouraged to involve themselves in activities that have the effect of reinforcing the significance of some of the central areas of enterprise policy for the EIC. An example would be the promotion of the 'Europartenariat' congresses, which are discrete events, but which can be complementary to other business co-operation activities.

The resourcing arrangements of the system have more subtle effects. The Commission is generous in its provision of material support to the EICs, both in the form of material and electronic information resources and in the back-up provided through training programmes, the encouragement of networking, access to EC institutions etc. After the initial period, however, the running costs of the EICs are largely borne by the host organizations. This has a number of effects.

At first sight the staffing of the EICs is a contributory factor to the breadth of their provision. Many of the staff, and especially managers, came into the EICs from the host organizations. This produced people with a variety of backgrounds. There are certainly some staff who have had business information training, but there are others that have had direct experience with the running of small businesses – some have a marketing or financial background, others have administrative experience in representative organizations or are from local government or academic institutions. But it has to be remembered that the host organizations were chosen on the basis of their established record in providing information and support to SMEs. The staff who at first sight appear to have such disparate interests and experiences, in fact have, to an important degree, a common background in the territory of enterprise policy.

Similarly a consideration of the revenue raising activities of the EICs reveals that they have more of a cohesive effect than might at first be supposed. Most EICs, particularly in the UK, are expected to raise income to support at least part of their activities. But this has a concentrating effect, since the EICs naturally play to their strengths in offering and developing their "commercial" services. Since most other EICs enjoy a similar material resource endowment, it should not be surprising that they offer similar services, in areas where they believe they have an absolute or a cost advantage over other agencies in the market. It is therefore usual to find EICs offering a monitoring service for clients who need to keep a watch on the official publication of the EC. In particular the provision of notices of tendering opportunities in other member states is commonly offered. The advertising of business co-operation opportunities, with varying degrees of support, is also offered by most EICs on a fee-paying basis. It is interesting to note the characteristics of these services. All of them rely on the particular type of information resource available to the EIC or the use of the particular networking possibilities of the system. And even though they are offered on a commercial basis, they are all closely related to the pursuit of the objectives of EC Enterprise Policy.

The question that now remains to be addressed is how, given its special orientation, the EIC network relates to organizations and institutions that are more squarely based on the professional management of information?

There is, to some extent, the clash of cultures that was referred to at the beginning of this paper, both within the system and in its relations with other agencies. The fact that the EICs are defined by their focus on providing information and assistance on European matters, primarily to a particular type of business client, is a major strength for them in the current stage of development of the European Community. But it is already apparent that as the volume of enquiries grows and as they involve more detailed and complex matters, a tendency widely reported from across the EC, there is going to be a greater need for the EICs to work more closely with their colleagues in other professional information services. Some EICs are already well advanced in establishing these working relationships. It is certain that the other will have to follow.

The EICs are still very much in their infancy, but because of the particular orientation given to their style of operation by the framework of EC enterprise policy, they are already offering a fascinating insight into how an information-based agency can work effectively in a complex and rapidly evolving environment in which the needs of individual clients are not well defined. It would be interesting to speculate whether the lessons from this system can be generalized.

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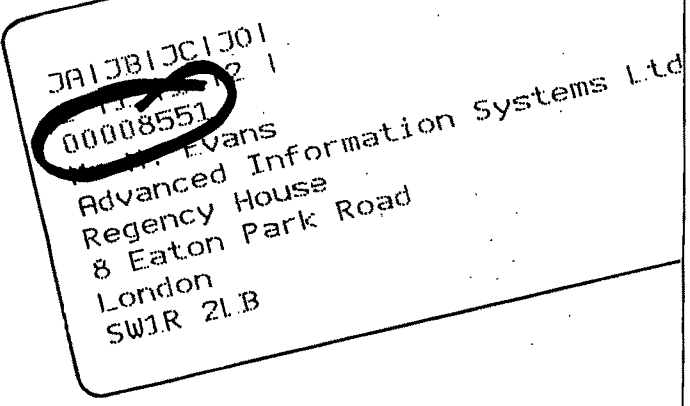

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Statistical information for businesses from Eurostat

Sara Mendosa
Commission of the European Communities

Paper presented at the Fourth Dawson's Research Seminar, held at Loughborough University of Technology on 18 September 1991.

(Abstract only)
Eurostat is one of the directorates-general of the Commission of the European Communities. Its aim is to create a European statistical system which will produce comparable statistics, by developing common classifications for products, industries, activities and regions, by surveys and questionnaires prepared by Eurostat in collaboration with the national statistical offices of the Member States and also by detailed methodologies giving common concepts and definitions for such areas as national accounts, agriculture and foreign trade.

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Company information in Spain: a case study

Sylvia Herd
The Leverhulme Trust

Paper presented at the Fourth Dawson's Research Seminar, held at Loughborough University of Technology on 18 September 1991.

Abstract

There is a growing interest in the business opportunities afforded by Spain. Consequently the demand for information on Spanish companies is growing continually but the information is not always easy to find. This paper sets out to examine the sources that are available both in the UK and in Spain, both hard copy and online, and to examine the background to the way in which Spanish companies have developed and why it is often difficult to obtain the required information.

Reasons for recent interest in the country are examined and mention made of the most common problems encountered. A description is given of the main sources of information with their relevant merits and demerits. In order to understand the reasons behind problems encountered a brief economic history of the country is given explaining how company registration in Spain differs from that in the UK. The different types of company are listed and recent changes in Spanish company legislation explained. The paper concludes by considering the possible position after 1992.

1. Introduction

This paper is based on an MSc dissertation on Spanish and Portuguese Company Information. The subject was chosen by the author, who is fluent in Spanish, in response to the growing needs of businesses for information on Spanish companies and in the light of the difficulties of obtaining such information.

Spain is now the ninth largest industrial power in the Western world and since the country's entry into the Common Market in 1986 interest in the area has gradually been increasing and the demand for information growing.

The three main reasons for this increased interest are as follows:-

a) Spain, as a country, is now extremely keen to entice foreign investment. As a result of EC funds the country is in a good position to offer very high incentives in return for foreign technology and expertise. Spain will continue as a net receiver of EC funds until at least 1992 and this backing means the country is now considered as a safe prospect for investment and loans. The country currently offers the highest levels of state assistance to new industries in Europe.[1]

Foreign investment in Spain was US$2.9billion in 1986[2] with West Germany as the lead European investor.

Foreign multinationals dominate the automobile industry and have an interest in electricals, chemicals, high technology products and banking.

b) Another incentive towards interest in the region is the prospect of cheap labour. Hourly manufacturing labour costs in Spain in 1986 were $6.47 compared to $7.67 in the UK, $13.85 in West Germany and an average of around $10 in the EC as a whole.[3]

c) Finally, the prospects for takeovers are good. Most Spanish firms are smaller than their European partners and so offer favourable opportunities to foreign firms who want to break into the market.

However, as mentioned previously, finding the required information is not always easy. Most people seeking information on Spanish companies usually encounter one or more of three main problems:-

a) availability
b) accuracy
c) language

a) Availability

This is the main complaint. It is generally felt that there are not enough different sources available and those that do exist do not enter into sufficient detail. It would appear that the Spanish database producers themselves show very little interest in making their product internationally available.

b) Accuracy

Another major problem is the accuracy of the sources that do exist. With so few sources readily accessible it is difficult to compare the information given, to check for accuracy. Where it is possible to compare one source with another, it is not uncommon to find discrepancies, particularly with regard to such basic details as address and telephone number, bringing the currency of the sources used into doubt.

c) Language

The third problem encountered is language. Most of the hard copy directories available tend not to be in English, thus limiting the choice to *Kompass España* and *PRODEI* or to online sources.

2. Sources of Spanish company information

2.1 Sources most commonly in use within the UK

The above-mentioned problems notwithstanding, there are in fact, several different sources of Spanish company information available and it may be comforting to know that those used in the UK are, in the main, those most widely used inside Spain.

2.1.1 Hard copy

The following is a list of the hard copy sources found to be in most common usage in the UK:-

Kompass España is cheap and well-known, the format and layout are the same as *Kompass UK* and so would be considered easy to use by those already familiar with that edition. It has the advantage of being in English as well as Spanish and other main languages, but does not have the third volume giving financial information and the only figure mentioned is registered capital.

Duns 15000 Principales Empresas Españolas (Main Spanish Companies) uses a four figure SIC code, lists Chairman and directors and number of employees and the activity of the company. It is in Spanish and the only financial details given are sales and a list of ranking by sales.

PRODEI's Católogo de la producción, exportación e importación española (Catalogue of Spanish production, export and import) is in four languages. It gives a list of trade marks and goods imported and exported together with the activity of a company but no financial details are given.

A fourth main general directory for Spain is *Las 2,500 mayores empresas españolas* (Spain's 2,500 main companies) produced by Fomento de la Producción. This currently lists 2,717 companies by province, income and sector. It lists 282 firms with more than 1,000 employees and 679 having turnover of more than Ptas 10,000 million. Other than these rankings by turnover and income, no financial details are given. It does, however, give details of ownership and is available on 5 1/4" and 3 1/2" diskettes. This is a fairly detailed directory but the disadvantage is that it is entirely in Spanish. All four directories are updated annually.

Two other general directories covering all industries are both entirely in Spanish and give no financial information: *Guiá comercial de las ciudades españolas* (Commercial guide to Spanish cities) published by Edinsa – Editores Internacionales SA, comes in two volumes: Volume I lists the 5,000 most important companies employing more than 50 people, by activity and Volume II lists the same companies by province. *Directorio de Sociedades – Consejeros y Directivos* (Directory of Companies – Directors and Executives) published by Dicodi SA lists 21,108 companies by activity, province and acronym in Part I and Part II gives details of 66,318 directors and executives.

The Spanish Chamber of Commerce in Great Britain publishes an *Anglo Spanish Trade Directory* which is a list of members in Spain and the UK by activity. The British Chamber of Commerce in Spain simply gives an alphabetical list of members in Spain.

There is a fairly wide range of directories covering individual industries or activities and by far the best collection of these is found at EMIC. *Guia Puntex* is a whole series of directories listing suppliers, products, trademarks. There is a summary and index in English but the rest of the directory is in Spanish. Sectors covered include pharmaceutical advertising, machinery, hospital equipment, dental equipment, optical equipment, jewellery, graphic arts, and the hotel trade. Directories also exist for other industries: food and drink, chemical industry, footwear, rubber industry etc. Most are in Spanish although some may contain a basic English index and none give financial information on the companies listed.

An important hard copy source in addition to annual reports and to industry specific journals, is the journal *Business Spain*. This is a monthly publication, in English, covering business news and market trends in Spain. It also publishes company results and a quarterly index of sources and business developments in the country.

2.1.2 Online databases

As with hard copy, the most widely used sources within the UK are Kompass Online and Dunsprint, and Duns International Market Identifiers. Just over 16,000 Spanish companies are mentioned on the Kompass database and the information given is the same as the hardcopy directory i.e. name and address, activity, number of employees and registered capital as the only financial information. The database can be accessed direct or via Dialog.

Dunsprint gives credit rating details of the companies and is only available direct from Dun & Bradstreet. Duns International Market Identifiers gives details of company name, address, telephone, SIC codes, number of employees, senior management and sales figures and is available on major hosts such as Dialog, Datastar and Pergamon as well as direct from the Company. Both databases cover approximately 126,000 Spanish companies.

Another useful source is Textline from Reuters which covers the Spanish publications *El Pais, La Vanguardia* and *Cinco Dias* in English translation!

2.2 Sources most commonly in use in Spain

2.2.1 Hard copy sources

a) Directories

The directories used by Spanish information professionals are often essentially the same as those used by their UK counterparts. Many regional and sectoral directories are also used. The consensus of opinion in Spain seems to be that directories are generally considered to be more up to date than the Spanish databases in existence and most private libraries have a good collection of these smaller directories together with bank reports and catalogues from trade fairs which, whilst they might be considered more as solely publicity material to an English information centre, are often the best (not to say only!) source in Spain. For reasons of both tax and terrorism, many companies are still reluctant to disclose detailed information on their organization, whereas they frequently produce fairly detailed advertising. The Spanish information professional has, consequently, had to become rather adept at interpreting this to suit his or her requirements. Often, when specific financial information is required, a credit-rating agency such as Dun & Bradstreet is used.

b) Newspapers and journals

Another consequence of the lack of confidence in Spanish databases is that private libraries or information centres spend what, to their English counterparts, would be a considerable amount of time and money providing a press cutting service. Baratz, the Spanish database covering the Spanish press, may be anything up to five months out of date for certain journals. The Spanish information profession could well do with a Spanish equivalent of Reuters Textline and Newsline!

The main newspapers of interest for company information are *El Pais*, *La Vanguardia* (both covered by Textline together with *Cinco Dias*) and *La Gaceta de los Negocios* – all dailies. There are now more economic journals than there used to be and, whilst these are not always as serious and informative as they might be, the level of journalism and quality of reporting is improving. The main weeklies are: *Actualidad Económica* and *El Economista* and monthlies: *Información Comercial Española*, *Papeles de Economia Española* and *Mundo Financiero*. The Banco de Espana also publishes a monthly *Boletín Estadístico* and the Banco Exterior de Espana *Boletín de Información Económica*.

2.2.2 Existing database provision and usage in Spain

Contrary to popular British belief, there are several different Spanish databases in existence. The 1989 edition of the *Directorio de centros de acceso a bases de datos* (Directory of Centres having access to online databases) produced by CIDC (Consorci d'Informació i Documentació de Catalunya, Calàbria 168, 08015 Barcelona) lists no fewer than 24 Spanish producers and the same publication states that the number of organizations having access to online databases has grown from 138 in 1985 to 325 in 1989, reflecting the increasing awareness within Spain of the usefulness and cost-effectiveness of timely information. Information on Spanish databases is contained in the *Católogo de servicios de información electrónica española* which is produced by FUINCA – Fundación para el fomento de la información automatizada, c. Alcalá 61, planta 2, 28014 Madrid.

However the Spanish online industry is beset by problems. When CIDC drew up details for the 1988 edition of *Tarifas de bases de datos online: hosts, bases y criterios de facturación* (Online database tariffs: hosts, databases and invoicing criteria) – the latest edition available – it was not considered realistic to include information on Spanish databases as most were still in the experimental stage and did not function in the same way as foreign hosts.

The main, and by far the most serious problem, facing the Spanish database industry at the present time is that of telecommunications, which will come as no surprise to anyone who has ever tried using the Spanish telephone system to any great extent.

The seriousness of these problems is such that the alternative of CD-ROM is gaining ever-wider acceptance within the country, particularly in organizations such as universities and hospitals where the updating of data is not so frequent as it would need to be in business and commerce. Ecosoc is a database of Economic, Sociological and Political texts produced by the Instituto de Información y Documentación en Ciencias Sociales y Humanidades (c. Pinar 19, 28006 Madrid) which is available on a CD-ROM produced in conjunction with Micronet. Videotex is another fast-growing field which some feel offers more possibilities.

The databases most frequently used within Spain to obtain company information tend to be the same as those used within the UK. Statistics for 1986 (the most recent available) show that Dun & Bradstreet was the second most used foreign host, accounting for 12.6% of all searches of foreign hosts, compared with 16.1% for Dialog and 10.6% for Datastar.[4]

Kompass Online is also used. It is based on information originally obtained from the various local Chambers of Commerce and followed up by questionnaires to the companies. As with most other databases and directories they often have serious problems in obtaining even such basic details as the correct company address for certain regions of the country because of the very real and serious threat of terrorism to the companies concerned.

This database does not give financial information and the company has no plans at the present time to take advantage of the new company law (see below, 3.3) to include such information in either its database or directory. The Spanish company Kompass Comercial y Distribuidora SA currently supplies details of 30,000 Spanish companies to the UK company, but lack of product detail means this is reduced to 16,000 companies on the database. The Spanish company is intending to increase this to 100,000. At the moment a company has to operate on a national level to be included on the database but most Spanish companies operate only on a regional level, so Kompass intends to introduce regional databases – Catalunya will be the first region to be put on the database.

Baratz (Servicios de Teledocumentación Baratz SA., Gaztambide 61, 28015 Madrid. Tel: 449 2048/ 244 3824) covers articles appearing in the Spanish press relating to the fields of politics, economics and labour. The company, started in 1977, has been available online within Spain since 1983 and is also available internationally. In 1986 it was the seventh most used Spanish database but is currently undergoing some changes and usage has consequently dropped.

ICEX (Instituto Español de Comerico Exterior – Spanish Foreign Trade Institute), the third most important host in 1986, currently offers eight databases under the joint name of SIBILA. Of these, only two are of interest to the UK information professional: OFERES and SYCE. OFERES is a database of 80,000 Spanish exporting companies – all of which have exported in the last five years. In addition to name and address it gives the value of exports, products exported and country exported to. For a third of these companies it also gives a detailed list of products in Spanish, English and French; Trademarks; Directors; languages spoken; registered capital; foreign associates and associations to which the company belongs. Sources used include Customs figures and questionnaires. The latest figures available are for 1988 and these are currently being updated. Export data is updated annually and details of the companies permanently.

SYCE offers a league table or ranking of these exporting companies in accordance with the following options:-

- Customs Tariff number
- Country or geographical region
- Geographical situation of company
- Value of exports

It offers less details on individual firms than OFERES but can be used as a complement to it. It is in Spanish, contains 50,000 references and is updated twice yearly. At the moment these two databases are only available inside Spain (for contact address see appendix 2). ICEX are considering making them available from abroad and producing special menus for this purpose but they were unable to indicate when this might be. They do not appear to be considering including financial information on the databases. To a certain extent these two databases would appear to constitute a duplication of some of the information supplied on the Camerdata database (see below). ICEX also offer Spanish companies cheaper access to the CELEX database (which Spain uses more than any other EEC country), yet in 1986 ten times more use was made of this database by accessing it direct via ECHO than via ICEX.

IMPI (Instituto de la Pequeña y Mediana Empresa Industrial – Institute for the Small and Medium Size Enterprise) is by far the most used commercial Spanish host, accounting for 60.9% of usage in 1986.[5] (For address see appendix 2). Some twelve different databases are produced, the most relevant of which will be mentioned. They are in Spanish, and Small and Medium Sized Enterprises (SMEs) can have free access to them by using the services of the local Chambers of Commerce and other Government agencies having online access.

- DATAEMP gives the name, address, sales and number of employees of 565,000 registered companies. The source used to prepare this database is Camerdata SA (see below) which begs the question of duplication of material.
- SERTEC is a new database covering 2,000 companies in the services industry, it gives principal and secondary activities and number of employees of the company.
- OFERTEC covers technological services offered by 600 engineering and consulting companies.
- BADASUB gives details of 4,500 subcontractors, the surface area of their factory, number of employees, the activity and machinery in which they deal, level of export and whether they have branches, together with general comments.
- BADECON is a small new database for the clothing industry. It has 200 entries and gives detailed information on the products manufactured and material used, and whether the company exports.
- LABOREN is another new database covering 150 experimental laboratories with details of the type of tests carried out.

In the literature produced by IMPI it is stated that DATAEMP is updated annually. All the others mentioned here are quoted as being updated 'periodically', so it is possible that the information given may not be correct. This would also serve to confirm the criticism often made of the IMPI databases that they are not up to date and often continue to cite companies which are no longer in existence.

The last Spanish database to be mentioned, but probably the one of most interest to the UK researcher, as it offers most possibilities, is Camerdata (for address see appendix 2). Camerdata is a Sociedad Anónima created by the 77 Chambers of Commerce and ICEX. This database contains 2,300,000 entries of entities ranging from small practices of doctors, accountants, architects etc. to large SAs and, as such, would appear to constitute the most hopeful source of information on the (many) smaller companies of which the English researcher is likely to require details. The database contains details of the type of organization and its activity, property and vehicles owned, number of employees and details of any foreign trade. The only financial figures currently included are turnover and value of any foreign trade. Data relating to foreign trade is updated twice a year, and other details are updated as they become available. This company, in common with all other Spanish database and directory producers, has to face the problem that many companies, particularly in the North of the country, are unwilling to supply information. Another problem is the different regional languages in use throughout the country – addresses can often be written in two or three different ways and these have to be standardized for the database.

Camerdata is a member of Chambernet Europe which has been created to link all European Chambers of Commerce in order to create a database of European companies. To this end their sister company (Tele-Camerdata, c. Captán Mendez Vigo 9, 05003 Avila) is putting the database on videotex and also on Iberpac X25 so that it may be accessed from abroad. They are also negotiating with the Ministerio de Hacienda (Treasury) to take advantage of new company law and include more financial data on the database together with VAT details, as from 1993. They also have plans to put the database on CD-ROM. The criticism made of the existing service is that it is expensive, but of the limited nationwide sources in existence this would appear to constitute the most useful and dynamic for the UK information professional.

2.2.3 Spanish information brokers

Information broking, as we understand it in the UK, is a very new concept in Spain. Operators tend to run broking services as a sideline to their main business. Most experience difficulties in making the business pay as Spanish businesses generally, even more so than their UK counterparts, are reluctant to pay for a product they perceive should be free. However, the number of information brokers in Spain is gradually increasing. Three of these, two in Barcelona and one in Madrid, are mentioned in appendix 2. Alice Keefer is an American who is fluent in both Castillian Spanish and Catalan and the other two companies have English speaking staff.

3. Background to the problems experienced

3.1 The development of Spanish companies

The Spanish Civil War, from 1936 to 1939, resulted in 36 years of fascist dictatorship under General Francisco Franco whose policy of national economic independence, with its insistence on agricultural rather than industrial development, served to retard the development of the nation in comparison with its Northern neighbours. The death of Franco in 1975 and accounts, have traditionally meant that Spanish companies generally, including the very largest, do not have the history of public accountability that we would expect in this country.

Indeed this latter point is one of the two main points concerning Spanish companies which it is very important to bear in mind: their size and their regionalization. There are few commercial household names in Spain and those that do exist are those either of banks, shops or multinationals. Very few Spanish companies operate on a national level: most do not extend beyond their province or region of origin and this is a point which should not be underestimated by the Information Scientist seeking information on Spanish companies. In Spain 95% of companies are small or medium sized compared with the EC average of 85%[6]. The systems operating under the previous regime instilled in entrepreneurs a basic aversion to size. Possible the main reason for this — and a fact which most British people would treat with incredulity — is that during the long Franco years only the very largest enterprises paid taxes. Most businesses and private individuals paid very little or none at all and fiscal fraud was (and to some extent still is) rife at all levels of society. Consequently both the individual and corporate mentality have a totally different attitude towards accountability to that of the more Northern European nations.

In 1977, two years after Franco's death, a survey of registered company capital showed that 66% of companies possessed Ptas. 10M or less (Ptas 10m is now the minimum capital requirement of SAs), just under 10% had registered capital of Ptas. 100m-250m and that 2% of the companies accounted for 67% of all capital registered[7]. In 1980 banks and electricity companies between them accounted for almost 80% of the capitalization of the Stock Market.[8] Spain has four Stock Markets – Madrid, Barcelona, Valencia and Bilbao, which between them quote the majority of the "large" companies. In 1983 the number of companies quoted was less than 150 and even in 1990 this number has only grown to 220, a fraction of the number of companies quoted on the London Stock Exchange.

3.2 The different types of company in Spain

July 1951 (Ley de Sociedades Anónimas) and the Sociedades de Responsabilidad Limitada by the Limited Liability Company Law of 17th July 1953 (Ley de Sociedades de Responsibilidad Limitada). Both types of company are considered legal entities and must be entered in the respective provincial commercial register. However, until this year only basic company details such as name, address, directors and business has to be registered and it was not mandatory to register any kind of financial information. In accordance with these laws there was no minimum capital requirement for either type or company nor a maximum for the SAs but the capital of an SL could not exceed Ptas.50m. nor could the number of participants in this type of company exceed 50. As a result of this, most medium to large enterprises (most of which would be considered small by European standards) elected to register as SAs rather than SLs with the result that SAs constitute by far the largest group of companies in the country at the present time.

3.3 Spanish law governing the publication and auditing of company accounts

Spain's entry into the Common Market has meant that measures have had to be taken to bring existing legislation into line with that of the rest of Europe and, as far as company law is concerned, to comply with the Fourth EC Directive of 26th February 1974 concerning the co-ordination of national accounts with regard to structure, content and methods of valuation and publication and the Seventh Directive of 28th April 1976 concerning the consolidation of group accounts giving details of the respective intra-group relationships.

To this end a new Corporation Law (Ley de Sociedades Anónimas) was passed on 25th July 1989 and came into effect on 1st January 1990. There are four outstanding changes introduced by the new law, with far-reaching consequences for Spanish business. The two of most interest for the information profession are those dealing with minimum capital requirements and auditing of accounts.

Article Four of the new law clearly states that the minimum capital of SAs may not be less than Ptas 10m. An appendix to the new law grants existing SAs until 30th June 1992 to increase their capital to this amount and SLs have the same deadline to increase their capital to Ptas. 500,000. Those companies unable or unwilling to meet the new minimum must convert to another type of company or face a penalty of Ptas 5m. It has already been mentioned that the majority of Spanish companies are currently registered as SAs having initially done so as a result of the greater freedom of movement granted to this type of company under the previous law. However, and as has been stressed, a considerable percentage of these companies are small.

This is a dilemma currently facing the majority of companies in the country and it is consequently impossible to judge with any exactitude how may SAs will remain after 30th June 1992. It may well be that many, if not most, of those not quoted on the Stock Exchange will have to re-register as SLs and this is a factor to be considered when assessing the impact of the new law on the publication and auditing of corporation accounts. The law also states that any company which has not fulfilled this requirement by 31st December 1995 will be dissolved and the entry removed from the commercial register, so that certainly from that latter date onwards there should be more hope of obtaining a realistic picture of the country's corporate structure and more accurate financial information on the larger Spanish companies.

Whilst this first change in the law will have repercussions on the availability of company information, the second change, namely the requirements concerning auditing of accounts, will have a direct effect not only on the availability of the information, but, more specifically, on its accuracy.

Under the previous Ley de Socidades Anónimas of 1951, directors of SAs had a period of five months from the financial year end to draw up a balance sheet and Profit and Loss accounts. Articles 108 et. seq. of that law dealt with share-holder auditors whose task was to examine the financial statements. Not only were these "auditors" unlikely to be qualified accountants, they were also very interested parties in the company's affairs.

Companies were not obliged to register the accounts with the Registro Mercantil (Trade Register) and no fines were imposed for non-publication of the accounts. The result of this was that few companies produced accounts and it is only in the last decade or so that the very largest have started to do so and even of these many are still approved by share-holder auditors rather than external auditors who are professional accountants. The Spanish information professional is still not yet able to count on the "glossies" which a City researcher would take for granted.

However, this is all set to change with the introduction of the new law, Chapter Seven of which deals specifically with the auditing of accounts. Accounts must now be drawn up within three months of the financial year end. However, in accordance with article 190.1 an abbreviated profit and loss account may be presented if any one of the following apply:

a) assets are less than Ptas.920m
b) net turnover is less than Ptas.1,920m
c) average number of employees for the year is less than 250[9]

With the exception of companies producing an abbreviated balance, the annual accounts and directors' report must be audited by auditors who will have at least one month from the date of receipt to present their report. A new General Accounting Plan is currently being introduced to bring both the training and professional qualifications of Spanish accountants and Spanish accounting practices into line with the rest of Europe.

For accounts produced with a financial year end after 30th June 1990 Articles 218-221 state that these accounts and auditors reports must be deposited with the Registro Mercantil within one month from approval and these records will be kept by the Registro Mercantil for six years. The Official Bulletin of the Registro Mercantil will publish a list of companies who have complied and a fine of Ptas 200,000-2m will be imposed for non-fulfilment of this requirement.

Article 220.2 specifies that any person may obtain information from the documents deposited. This constitutes the first serious step in Spanish legislation to ensure that not only are accurate and reliable financial records kept by companies but that these are publicly available. In theory at least this should have interesting results for the Spanish and European information profession, not to mention a near revolutionary effect on the way information scientists operate within the country, once they become aware of the consequences of the new legislation.

4. Conclusion

To date the poor availability of data has been a result of historical, economic and legal developments within Spain, but what of the future? Now that it is a member of the European Community the legal framework within which Spanish companies operate is changing radically and more accurate company information will have to be made publicly available, at least for the large corporations, as it is in the rest of Europe. Whilst this can only be good news for the information professional, the problem of size remains, at least for the time being. The majority of Spanish companies are small and, as such, are not compelled to disclose their financial affairs. It remains to be seen exactly how this situation will alter with the coming of the Single Market in 1992, but it is possible that many companies will not be able to compete with their larger competitors throughout Europe and will either collapse or be forced to merge into larger companies. It is unlikely that, for the foreseeable future, many new Spanish corporations will emerge from this situation, so the area will continue to contain a large number of companies which are not of sufficient stature to have to publicize their accounts.

Notwithstanding this rather difficult state of affairs, there are – perhaps surprisingly in view of the economic development of the country – several companies producing publicly accessible databases of company information. Of the three main Spanish company database producers mentioned only one, Camerdata, seems to be fully aware of the implications of the recent changes in Spanish mercantile law and the effect this would have on publication of accounts. Neither IMPI or ICEX appear fully aware of the potential demand for access to their databases on the part of foreign researchers and the effects this could have on their business. In Spain it is mostly government-dependent organizations who produce these databases and they are not spurred on by incentive of the profit motive.

Camerdata seemed aware of the opportunities ahead of them and have firm plans to make online access to their databases internationally available, although they are not speaking to the major international host organizations to make their data available in a format that most UK information professionals would welcome. So the immediate future holds the prospect of the information becoming more readily available but by means of databases using different search terms and, quite probably, in their original language.

Appendix One

Table of databases covering Spanish company information

Database	No. of Cos. included
Camerdata	2,300,000
Dataemp	565,000
Duns IMI	126,134
Dunsprint	126,134
Oferes	80,000
Syce	50,000
Kompass Online	16,000
Badasub	4,500
Sertec	2,000
Ofertec	600
Badecon	200
Laboren	150

Appendix Two

Spanish database or hardcopy providers

José Manuel Garcia-Huerta,
Camerdata,
Alfonso XI, 3,
28014 Madrid.
Tel: 521 29 83/84
Fax: 522 88 73

Douglas Hogge,
Dun & Bradstreet SA,
Orense 81, 6,
Madrid 28020.
Tel: 571 0800

Amparo Vera,
Instituto Español de Comercio Exterior,
Paseo de la Castellana 14,
28046 Madrid.
Tel: 431 1240
Fax: 431 6128

Instituto de la pequeña y mediana empresa industrial,
Paseo de la Castellana, 141 – 2a. planta,
28046 Madrid.
Tel: 450 8048
Fax: 571 2831

Luis Cobo Arjona,
Kompass Comercial y Distribuidora Sa.,
Llansà 37,
08015 Barcelona.
Tel: 423 9880
Fax: 426 4328

Spanish information brokers

Alice Keefer-Riva,
Doc6,
Tuset, 21, 6e, 3a.,
08006 Barcelona.
Tel: 414 0679
Fax: 201 6357

Eulalia Ferrando i Miralles,
Institute Català de Tecnologia
P1. Ramón Berenguer, 1 pral.,
08002 Barcelona.
Tel: 315 1613
Fax: 319 6042

Sr. Lopez Aguado,
Instituto de información y
Documentación en Ciencia y Technologia,
Joaquin Costa 22,
28002 Madrid.
Tel: 563 5482
Fax: 411 3710

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Using statistics for desk research

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Paper presented at the Fourth Dawson's Research Seminar, held at Loughborough University of Technology on 18 September 1991.

Introduction

This is a very large subject area to discuss in forty minutes, therefore, I would like to begin by defining the aspects of the subject I intend to deal with. The statistics in the title refer to business and economic statistics only, examples of which are published by central statistical departments, trade associations and commercial publishers etc. Desk research is used to describe the process of gathering information available in published form, rather than obtaining the data directly.

The aim of this paper is to discuss, in general terms, the types of sources that are available, and to discuss a few of the problems that may be encountered when using this type of data. This is not meant to be a comprehensive guide to sources – rather an indication of how to identify appropriate starting points for gathering data.

There are two types of business and economic statistics. Official statistics, collected and published by governments, and non-official statistics. The latter are collected by a wide variety of organizations, some of whom will be dealt with later on.

1. Official statistics

Collected and published by both international and national governmental agencies. Information is collected about all aspects of society, but we shall only be dealing with a few topics relevant to business. However, when undertaking desk research, all publications and series should be assessed for relevance to the topic being researched.

1.1 National agencies

The most prolific generators of statistics are national governments. Most countries have a centralized system for the collection and dissemination: Germany's Statistisches Bundesamt is one such agency with a slight difference. Although they are responsible for collating the data at a national level the base data is all collected at a local level. More typical examples of centralized services would be the Dutch Central Bureaux of Statistics. By contrast the United Kingdom has a decentralized system where each principle government department has its own statistical division which collects, analyses and publishes data with the Central Statistical Office (CSO) having a coordinating role.

The Export Market Information Centre (EMIC) produces a list of *National Statistical Offices Of the World*[1]. This publication contains all the relevant office contact details (Name, address, telephone and fax numbers).

When using national statistics it is often helpful to bare in mind that they are collected primarily for the use of government. Publication is a secondary aim and therefore the data may not be published in a form relevant to a business researcher's requirement. Another important point to remember is that not all information the government collects is published. It is sometimes possible to contact departments or statistical offices directly to obtain more detailed or up to date information.

1.2 International agencies

Many of the international agencies who publish statistical data act as co-ordinating bodies, collecting data from each national source. The statistical offices have great problems ensuring that all the information is comparable and reliable. This makes these sources useful for comparative purposes, but obviously there is a considerable time lapse between the availability of national data and international publications. Some of the major publishers of this data are:

Eurostat for the European Community
UN (United Nations) through its departments
IMF (International Monetary Fund)
OECD (Organization for Economic Cooperation and Development)

1.3 Summary statistics

Two types of government statistical publications are produced. Those which bring together statistics from many sources for easy reference are called summary statistics.

For Example:

France	*Annuaire Statistique De la France*[2]
Germany	*Statistisches Jahrbuch*[3]
UK	*Annual Abstract of Statistics*[4] *Key Data: UK Social and Business Statistics*[5]
Europe	*Central and Eastern Europe*[6]

This type of source usually has a very broad coverage although there are some exceptions. They are especially

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useful for obtaining answers very quickly about the general situation in a country or region. Most countries publish an annual abstract or yearbook of statistics.

The coverage of these publications is similar. They all contain sections on topics such as population, social conditions, health, law, education, employment, defence, energy, industry, agriculture, trade, transport, national accounts, prices and finance.

Monthly summary statistics are often published which contain similar information to the annual summary statistics, but they do not usually update all the tables contained in the yearbook as space is limited.

For Example:

France	*Bulletin Mensuel de Statistique*[7]
UK	*Monthly Digest of Statistics*[8]
Europe	*Eurostatistics*[9]

Examples of more specific summary publications include popular titles from the CSO:

Social Trends[10] (annual)
Regional Trends[11] (annual)
Economic Trends[12] (monthly)

1.4 Specific statistics

Governments publish a very wide range of statistical series. Here are three examples relevant to business.

1.4.1 Trade statistics

Are the most comparable nationally produced sources because many countries arrange their publications according to the harmonized trade classification scheme. This is an eleven digit classification which allows national subdivisions (after the eighth digit). The differences are especially apparent when comparing the EC and Scandinavian countries data.

The HS system was developed by Eurostat and replaces the combined nomenclature (also known as Nimexe). These schemes are similar but HS is more detailed. The EC countries began using this classification in 1988 and since then many other countries and regions, including the US, Scandinavia and Canada, have also adopted it.

Problems arise when comparing time series trade data, as comparison between classifications may be required (eg. HS, Nimexe and [SITC R3] Standard International Trade Classification Revision 3).

Trade statistics are published in a variety of formats. For example the EC publishes statistics of the member countries annually (in printed form), quarterly (microfiche) and monthly (CD-ROM). Magnetic tapes are also available. Another very useful international service is the Tradstat database offered by Datastar.

Other international publishers include UN and OECD who publish both printed and fiche services arranged by the SITC R3 classification.

Most countries also publish statistics in annual and/or monthly printed forms.

The major area of concern for trade statistic users in EC countries is the likely quality of data available for intra EC trade following the Single European Market in January 1993. Good trade data is essential for business to allow accurate monitoring of consumption trends and identifying market opportunities.

When the implementation of the single market comes into operation there will be no customs declaration for trade between EC countries and the data will be the responsibility of the traders to supply the data to the customs and excise.

Obtaining the data will be linked to the current collection of VAT. Two new boxes will be added to the VAT form with regard to total imports and exports. In the UK about 20% of the top companies will be asked to fill in detailed monthly returns. This is thought to represent 96% of total trade. In most cases companies with exports or imports of over £250,000 would be included in the survey undertaken each month. Many of the potential suppliers of this data have expressed an interest in supplying the data in electronic format and consequently a new electronic data capture service is being developed.

1.4.2 Production

The problems of comparing trade data are insignificant compared to those encountered when using production data. International agencies publish production data, but it is either at a very broad level, and not very current (for example UN[13]) or it is not always directly comparable. There are two international classification systems used. ISIC (International standard industrial classification) is favoured by the UN and OECD while the EC provides data classified by NACE (nomenclature generale d'activities economique).

Eurostat publish production data on a quarterly basis[14]. The source of the data is national statistical offices, but the Commission is unable to publish it all in a harmonized form because of the varying methods of collection used. About half the data in this publication is harmonized. This situation is about to change for the better.

The EC started the Prodcom project about two and a half years ago. The aim of the new system is to produce production statistics on a comparable basis throughout Europe. In addition, both the US and Japan are interested in this new development and may also use the new system for the basis of their own production statistics.

4,000 of the 5,500 items will be identical to the harmonized combined nomenclature. This will be very useful both for production and for trade data.

The data will then be collected on an annual basis and there may be monthly and quarterly surveys of selected products. The collection process should cover about 90% of all production and this will be a great improvement compared to current coverage.

The classification will be an eight digit code, the first four digits based on the current NACE. It is a shame that the scheme will not be based on the trade classification but it is expected that there will be clear linkages between the systems. The project is likely to be fully operational in 1994-5.

National production statistics are currently published according to national classification schemes. These differ greatly in the level of detail they offer.

A large number of problems can be encountered when using this data. In Margaret Brittin's article *European Market Data: how to find production statistics*[15] they are summarized as: Difference of coverage, Lack of harmonization, Conversion, Reliability, Currency, Language, Availability and Backup.

There is very little consistency as to how and when production data is published. It can be published annually, semi annually, quarterly, monthly or infrequently. Some countries have separate publications which cover production and industrial census data while other countries produce just one title which provides data on production and the structure and performance of industry. A good example of this is the Belgian publication, *Statistiques Industrielles*[16] which includes details of production, size of establishments, number of employees, capital expenditure and output. The UK publishes the *Business Monitor Series* (production)[17] and the *Census of production*[18].

It will be very interesting when the Prodcom system has been established, because it is possible that some or all of the European countries will opt to switch to this classification scheme. If this happens many of the current problems of using this data will be solved.

1.4.3 National accounts

Are useful for examining the performance of an economy. They are very valuable to a business when considering its current and future markets. They are published by national and international agencies, but they usually provide similar coverage. Taking the OECD *National Accounts*: *detailed tables*[19] as an example, the data provided includes:

Expenditure on the GDP (Gross Domestic Product) at current and constant prices
Private final consumption
Gross fixed capital formation by activity of owner
Gross fixed capital formation by type of goods
Accounts for general government
Accounts for state and provincial government
Accounts for local government
Social security funds
Accounts for non-financial and financial corporate enterprises
Accounts for households
External transactions
Capital finance by sector
GDP by kind of activity
Cost components of value added by activity
Profit shares and rates of return on capital

There is a great deal more information available from official statistics. One of the most reliable methods of identifying appropriate sources is to use guides to the literature and bibliographies. The obvious starting point is to identify the relevant national guides such as the CSO *Guide to Official Statistics*[20]. These are usually produced by the National Statistics services, however in the UK, Keynote publish *Keynote Guides: Official Business Statistics*[21]. This is a very useful publication as it provides information about the sectors and statistics as well as subject access to the bibliographic details. Most guides are published in the national language, however Statistisches Bundesamt publish their guide in English as well as German. It is called the *Survey of German Federal Statistics*[22].

General guides to official publishing are also useful. These guides usually have sections on statistical publications. The excellent guide to EC publications *The documentation of the European Communities*[23] has a very useful chapter on Eurostat publications.

2. Non-official statistics

A variety of bodies are involved in non-official statistical publishing and the number of titles available is on the increase.

There is a significant overlap between the coverage of official and unofficial sources. Many of the most popular sectors such as chemicals, textiles and the motor industry are covered by both types of publication. The difference is that unofficial sources often offer alternative or more detailed information. Data on particular markets is also more often accessible in non official sources and new product areas are usually covered before official figures become available.

Apart from commercial publishers the data is usually collected for the requirements of the organization, but it is often recognized that they will be of wider interest. The motive for collecting the data is as diverse as the number of publications available. In some cases it may be collected because the data is not available from other sources, while other organizations collect the data because they do not feel that the official data accurately reflects their interests. One example of this is the Computer Services Associations throughout Europe. They regularly survey their members because the information collected at an official level doesn't accurately reflect the structure of their industry. Much of the available data is concerned with sales of equipment. It is an important part of the market but it does not contribute as large a part of the sector's business as some of the official statistics would suggest.

It is quite common for non-official sources to repackage existing information in a form relevant to a specific audience. However, research by the University of Warwick Business Information Service has identified that 41% of non-official sources are based on original research or survey work carried out by the producing body. 11% are based on other non-official sources while only 6% are based entirely on government statistics.

There are general publications which bring together information from a range of sources, some examples of which include:

International marketing data and statistics[24]
Consumer Europe[25]
Eastern Europe[26]
Western Europe 1989: a political and economic survey[27]
The Economist Book of World Vital Statistics[28]

The following are a few of the organizations who produce statistics on particular sectors.

2.1 Trade associations and professional bodies

There are thousands of these organizations. Some are international whilst most work on a national basis.

Trade associations are by far the largest producers of unofficial statistics. A survey undertaken by the University of Warwick Business Information Service identified trade associations and trade journals as the major publishers of the type of information providing 25% and 15% respectively of the total titles published.

Many do not publish any statistics while others publish a range of statistical titles. In between the two extremes, there are a number of bodies publishing a regular title on their area of interest. The Building Services Research and Information Association *Quarterly Statistical Bulletin*[29] is one example.

Some nationally-based organizations publish information of international interest. There are a number of examples of this in the motor industry.

In the USA the Motor Vehicle Manufacturers Association of the United States publish an annual title called *World Motor Vehicle Data*[30]. The Society of Motor Manufacturers and Traders in the UK publish *World Automotive Statistics*[31] each year and also produce a monthly publication which contains international statistics. In Germany Verband der Automobilindustrie E V publish *Tatsachen und Zahlen*[32] annually which also includes international data.

2.2 Market research consultants

Many consultants publish statistical reports. There are many industry reports published by organizations such as the Economist Intelligence Unit or IDC. These can be either national or international in their coverage. They usually provide a great deal of market information as well as statistics. Some of these provide more statistics than others. The ICC business ratio reports and Keynote reports contain a great deal of statistical data.[33]

2.3 Banks

Usually provide general economic statistics on individual countries, distributed free of charge. National banks also publish information in their annual reports, and several publish regular statistical series. The Deutsche Bundesbank is the most prolific publisher. It produces a monthly report of the Deutsche Bundesbank[34] in both German and English and a large number of statistical series covering all aspects of the German economy.

2.4 Stockbrokers

Stockbroker's reports can be useful sources of information provided that you can obtain access to the reports. Many of their reports often have a limited circulation, sometimes because they are confidential, but often because the reports are not publicized widely. Some stockbrokers, however, have realized that there is a market for their publications and make them available on subscription: Wood Mackenzie & Co, for example, offer an annual subscription to their reports on the oil industry, and Vickers de Costa have a similar facility for their quarterly reports on leisure industry.

2.5 Local authority

Many of the larger authorities publish regular statistics on social and economic trends in their area. For example, Coventry City Council publishes *Economic Monitor*[35], a quarterly review of trends in the local economy. As with stockbrokers, however, there is very little publicity about, or distribution of the reports outside the respective local authority area. Nevertheless, these publications can often provide local information to supplement the statistical information down to regional level given in many central government publications. The level of information produced by local government will obviously depend upon national requirements. For instance, in Germany it is the local statistical offices who are responsible for collecting all the statistical data but the national office who publish it all.

2.6 Universities and colleges

One or two academic institutions have started to publish regular statistical titles, very often resulting from research, being undertaken within a particular institution. For example, the London Business School publish *International Economic Outlook.*[36]

2.7 Private companies

For many companies, the publication of statistical reviews of their industry can be a good PR exercise, but very often they are also useful sources of information. A well-established example is BP's annual *Statistical Review of World Energy.*[37]

2.8 Trade journals

Statistics contained in trade journals are the most difficult to obtain but often the most useful. Some journals such as the *Grocer*[38] contain regular statistical tables. Once you have identified the issue which containes the relevant data you will be able to use it again and again. However, much of this data is incorporated into the text of a specific article which makes it very difficult to identify.

There are indexing and abstracting services which can help to identify relevant sources as well as the periodical's own index (if it has one).

Automated services available online or in CD-ROM form are very useful in helping to identify this type of data. A few examples include:

Textline – a full text service (online)
Predicast's Promt – an abstracting/full text service (online and CD-ROM)
F&S Indexes Plus (online and CD-ROM)

Printed bibliographic tools such as *Research index*[39] and Predicast's *Promt*[40] can also be useful, although they take much longer to use.

If all else fails, the editorial staff of appropriate journals can be approached directly. They are very knowledgeable and are usually very helpful. There are several publications which will help identify relevant journals, *Willings press guide*[41] and *Benns media guide*[42] being two of the most popular.

There are very few reference guides to non-official statistical information. A few publications which may be of use are listed below.

European Directory of Non Official Statistical Sources[43]
Sources of European Economic and Business Information[44]
International Directory of Unofficial UK Statistics[45]
Sources of Unofficial UK Statistics[46]
Statistics Europe: sources for social economic and market research[47]

3. The use of statistics

This is a very brief review of just a few of the points to consider when you come to use the data once it has been identified.

We have established that the motives for collecting are varied, but the way in which the data is used is often very specific.

Is it quite common to mistrust statistics, but in many cases it is the way in which they are being used that should come under more scrutiny. If errors have been made or deliberately introduced in the data then the figures will be misleading. It is important to be able to assess the methodology used and the credibility of the issuing body. International economic statistics are often considered more reliable as they are not open to the same level of political pressure, eg UK unemployment data. Even if the data is accurate and has been issued by a credible organization it is still possible to use the data in a misleading manner.

Statistics can be used to help aid the decision-making process or they can be used to prove a point. These uses are not mutually exclusive.

If they are being used as part of the decision-making process they are usually one aspect of a larger picture. The fact that ice-cream sales have fallen for the last six months does not necessarily spell disaster for a company. It probably just means that it is summer. However, if sales have been dropping while those of the company's rivals have been increasing, they probably do have a problem. Statistics used in isolation can be misleading. It is important to build up the largest possible picture of the situation.

Probably the most important element in the use of statistics is presentation. A great deal of care should go into how they are to be presented and why they have been presented in a particular way.

Tables of figures are not very digestible to most people. They will often be ignored or overlooked. It is a good practice to put any obvious conclusions to be drawn from the data in a verbal and graphical form.

Graphical representation can have a dramatic effect. All the following graphs are based on the same data. By altering the starting points on the axis it makes a very different visual statement about Yum Tums Ltd. The average sales have been made to look like a superb performance.

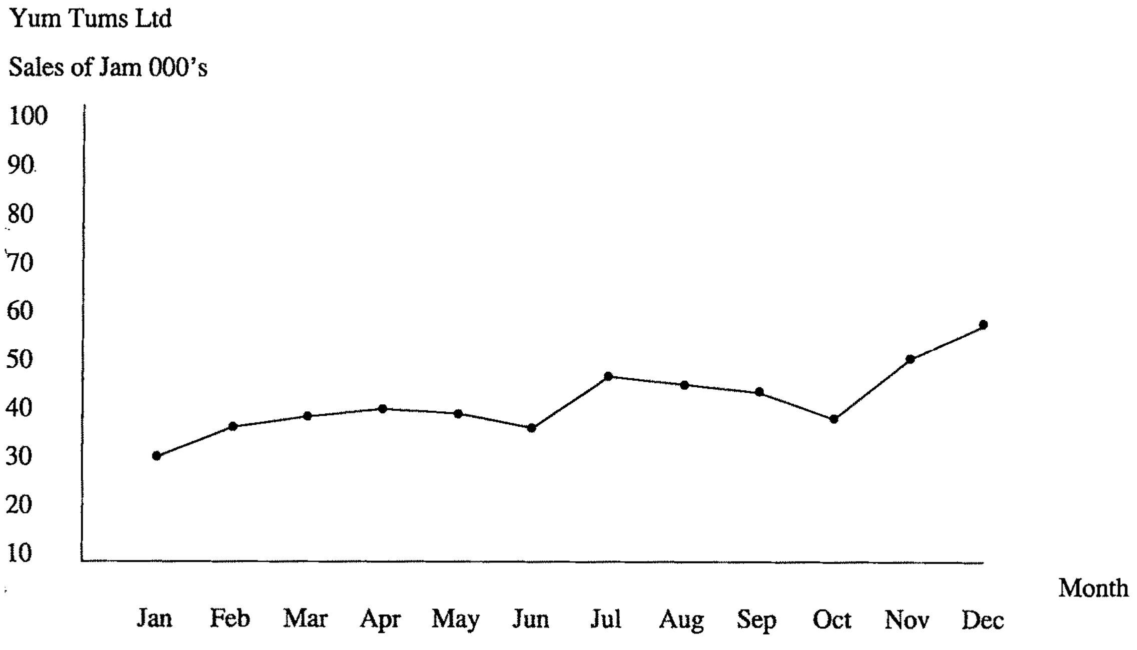

Figure 1

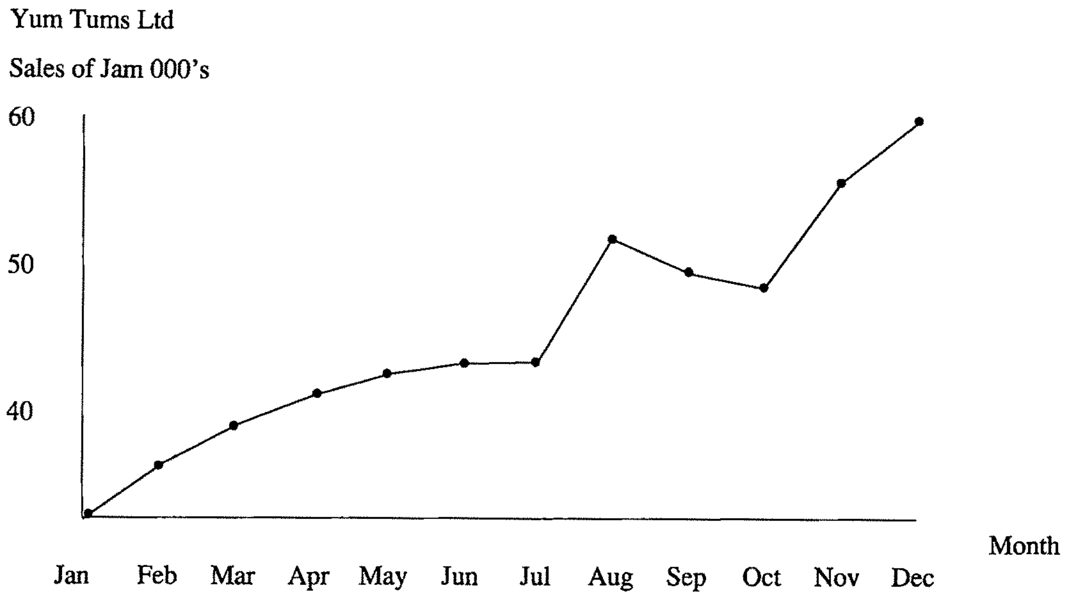

Figure 2

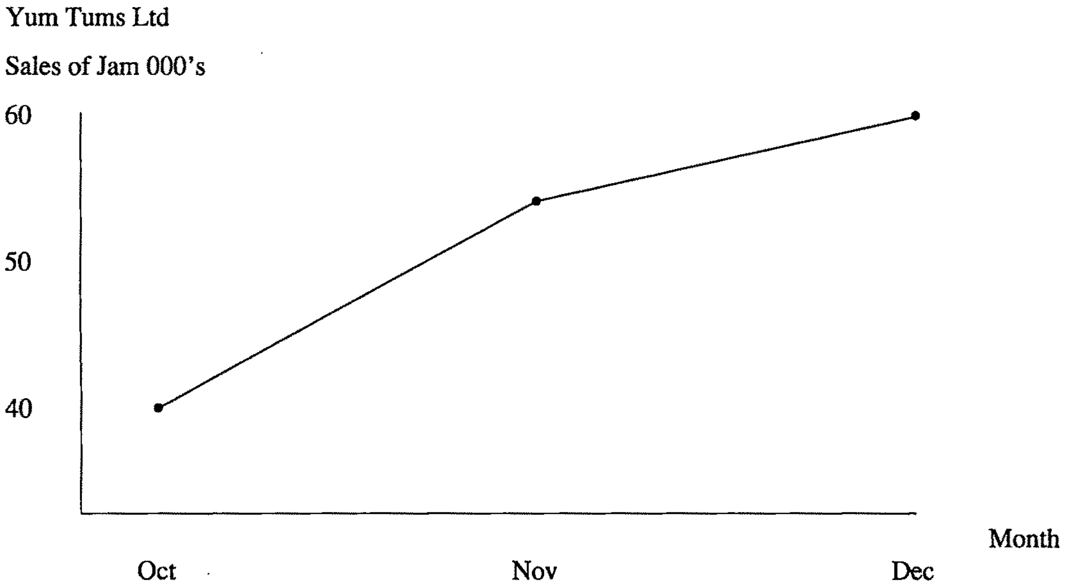

Figure 3

Presentation may have its pitfalls but it also has its advantages. A few words of explanation can quickly convey the pertinent facts without readers having to study the data for themselves. It may also draw the readers attention away from facts the producer does not want to be considered. If too many statistics are given they can draw attention away from the matters under consideration.

Different numbers expressing the same measure do not necessarily mean that one set is incorrect. Some statistics are compiled using a sample of statistical significance. These can be very useful measures, but they will probably not yield the same result as a census where all appropriate bodies are questioned.

Some information may be time-sensitive. If we take trade as an example, the UK trade figures for exports of typewriters to Germany may differ in quantity to the German import figures because exports registered on the 31st of the month will not be received until the next month.

In conclusion, statistics can be very useful to busine and commerce. Although a great deal of informati is available in published sources, it can be difficult identify. Some of the most useful information is qu likely to be confidential to a company, association government. It must not be assumed that all reque for data can be answered as many may pro impossible. As it can be a very time consuming proce acquiring this data, an assessment of its importance should always be undertaken. Care should always be taken when comparing or interpreting statistical information.

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BIOSIS: its agricultural coverage and products

Nigel Robinson
BIOSIS UK

Paper presented at a joint meeting of the Aslib Biosciences Group and ALISSE entitled New Dimensions in Agricultural Information, held in Reading on the 1 November 1991.

BIOSIS is the world's largest abstracting and indexing service for biological and biomedical research. An independent not-for-profit organization, BIOSIS was founded in 1926 and aims to make life science information available to the scientific community through its bibliographic databases and related services. In fulfilling this aim during the last 65 years, BIOSIS has grown and now supports over 100 products and services, being best known for its printed publications, *Biological Abstracts (BA)* and *Biological Abstracts/RRM (Reports, Reviews & Meetings) (BA/RRM)*. Following an agreement in 1980, BIOSIS and the Zoological Society of London now jointly publish *Zoological Record*, the oldest continuing index to zoological literature, which was the first published in 1865. BIOSIS UK is concerned primarily with the production of this database, although staff are also involved in the education of users and promotion of all BIOSIS products in the UK.

This discussion will focus on the various electronic databases and services BIOSIS provides which contain agricultural information.

Coverage

Since 1926, the amount of published biological and biomedical literature has greatly increased. To keep pace with this increase and provide its users with the information they need, BIOSIS has expanded its coverage. This is illustrated by the fact that in the first 30 years, BIOSIS indexed 1 million items; now, one million records are added in under two years. Today, BIOSIS monitors over 7600 serials plus books, monographs and other non-serial publications from more than 90 countries. Of these, most are published in Europe and the Middle East (49.65%). North America (28.94%), Asia and Australasia (15.38%) produce slightly less, and the minority originate from Central and South America (4.28%) and Africa (1.75%). Despite this geographical diversity of source material, over 86% of items are published in English. Subjects covered range from the traditional areas of botany, zoology and microbiology through applied topics such as agriculture and medicine to interdisciplinary areas including instrumentation and methodology. Of the 7600 serials monitored, over 1500 (19.7%) focus primarily on agriculture. Agricultural subject coverage includes topics such as veterinary science, economic entomology, phytopathology, weed control, soil science, agronomy and animal/poultry production and many of the products and services offered today have some agricultural content (Figure 1).

Figure 1. Agriculture related products

Printed Reference Publications
Biological Abstracts
Biological Abstracts/RRM (Reports, Reviews, Meetings)

Current awareness products
Abstracts of Entomology
Abstracts of Mycology
B-I-T-S (BIOSIS Information Transfer System)

Online products & services
BIOSIS Previews
BioBusiness
The Life Science Network

Compact disc products
Biological Abstracts on Compact Disc
Biological Abstracts/RRM on Compact Disc

Products

BIOSIS Previews

BA has been published continuously since 1926 and provides worldwide coverage of research articles. Citations and abstracts appear in English. *BA/RRM*, published since 1980, contains citations to research reports, review articles, books and meetings literature, a growing and very important area, often containing unique information which cannot be found elsewhere. These two print publications are combined into a single computer searchable database, *BIOSIS Previews*, which is available through several online search systems. The database contains the bibliographic citations and abstracts from the printed products together with additional indexing to enhance online searching capability. The total BIOSIS database from 1926 contains over ten million records. Of these, over eight million are available online in *BIOSIS Previews*. 540,000 items were added in 1991 and 540,000 are planned for 1992. Within *BIOSIS Previews*, the agriculture related subset is approximately 11%. This means that each year over 59,000 agricultural records are added to the database.

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Biobusiness

A significant amount of agricultural information is also included in another BIOSIS database, *BioBusiness*, which specializes in the economic or commercial applications of biological research. Some of the other main areas covered are biotechnology, cosmetics, pharmaceuticals, forestry, foods and beverages and US patents. The database was launched in 1985 and now holds approximately 400,000 records; around 85,000 items are added each year. Approximately 40% of the database relates to agriculture, a much larger percentage than *BIOSIS Previews*, reflecting the emphasis on applied areas of biology, agriculture being one of the largest of these. As with *BIOSIS Previews*, coverage has increased and approximately 30,000 items relating to agriculture are now added per year.

Compact disc products

In 1990, BIOSIS launched its first CD-ROM product – *Biological Abstracts on Compact Disc (BA on CD)* and in 1991 *Biological Abstracts/RRM in Compact Disc (BA/RRM on CD)* was produced. Discs are issued quarterly and are cumulative throughout the year. The second and fourth discs, covering a year's worth of literature are retained by the user at no extra charge. These products offer the same powerful retrieval capabilities as the *BIOSIS Previews* database and use the established SilverPlatter search software.

Access and distribution methods

In addition to making enhancements to the databases and taking advantage of recent technological innovations, new distribution methods have also been developed. Many of these changes are in response to user's requests.

Single-fee online pricing programme

An example is the single-fee online pricing programme, which is now offered to academic, commercial and governmental institutions. There are two ways to participate. The *BIOSIS Previews* tapes can be leased directly and searched on-site with the users' own search software; or, they can be accessed through the participating online search systems such as Dialog, BRS etc. Either way a fixed annual fee is paid for unlimited use of the *BIOSIS Previews* database. Pricing is based on the number of people in the access population and the number of years of data leased. The online vendors make an additional charge if their facilities are used. This is proving to be an attractive way of budgeting for online expenditure before doing any searching.

Life Science Network

Access to BIOSIS' data is therefore provided in a number of ways, most of which requires some skill and knowledge on the part of the user. To make information more accessible to the end-user and novice searcher, BIOSIS launched a new service in March 1991, the *Life Science Network (LSN)*. The *LSN* is a state-of-the-art, menu-driven network which provides access not only to BIOSIS databases, but also to CAB Abstracts, Medline, Embase and approximately 80 other databases in the life sciences. It is surprisingly easy to use; little knowledge of computerized searching, command languages or database content is needed. In designing the *LSN*, there were several goals BIOSIS wanted to achieve. Above all, the search results must be accurate, relevant references to the life science literature; this must be accomplished whilst allowing access to multiple databases. It was also decided that it would be preferable if charges were based on results rather than the more traditional connect time (See below).

The *LSN* also provides access to the unique *BIOSIS Connection* databases (Figure 2). These include smaller, specialized databases as well as the main BIOSIS online files. *Bioexpress is* a current awareness database which offers citations of *BIOSIS Previews* items very quickly after publication before they are fully processed for the *BIOSIS Previews* database.

Figure 2. *BIOSIS Connection* databases

BioBusiness
BioExpress
Biology Digest Online
BIOSIS Previews
Multiple Sclerosis Research Literature
Multiple Sclerosis Research Projects
Zoological Record Online

After connecting to the *LSN* a main menu is displayed (Figure 3). This gives 16 scan categories from which to choose. Each of the groups scan the databases which give the best search results for a particular topic. There is also an opportunity to choose the *BIOSIS Connection* databases, a specific database, information screens for announcements, instructions or pricing, or a database directory of all the 80 available databases.

Choosing the Agriculture scan category from this menu, produces a prompt for search terms to be entered. From here, various help screens as well as the database included in the scan topic can be reviewed. The agriculture group of databases are shown in Figure 4.

When a scan has been submitted, the *LSN* automatically connects to the appropriate search systems and accesses the relevant databases in the selected group. A table of results is produced (Figure 5).

The databases containing the most information relevant to the scan topic can be reviewed. The database with the greatest number of records is put at the top of the list and the others follow in descending order of retrieval. The menu also indicates the format of the database (full-text, abstracts, references) as well as the main source type (journals, books, dissertations etc.). From these scan results, the database(s) from which records are to be extracted can be selected. The *LSN* will again automatically connect to the appropriate

Figure 3. *Life Science Network* main menu screen

```
                *Life Science Network Main Menu*
             For professional assistance call our Help Desk
      1-800-523-4806 (US except PA); worldwide 215 587-4847

                  SCAN A GROUP OF DATABASES

   1  General Biology           9  Food & Nutrition
   2  Agriculture              10  Foundations & Grants
   3  Behavioural Science      11  Medicine
   4  Biochemistry             12  Microbiology
   5  Biotechnology            13  Patents
   6  Botany                   14  Pharmacology
   7  Cosmetics                15  Toxicology
   8  Environmental Science    16  Zoology

                     SELECT A DATABASE

  17  BIOSIS Connection        18  You Select The
        Database                     Database

                SERVICE INFORMATION & HELP

  19  Network Announcements    21  Pricing
  20  Instructions             22  Database Directory
  ->
```

Figure 4. Databases searched in agricultural scan using *Life Science Network*.

Agricola
BioBusiness
BioCommerce
  Abstracts
  & Directory
BioExpress
Biology Digest Online
BIOSIS Previews
Books in Print
CA Search
Current Research
  Information/USDA
Dissertation Abstracts
  Online
Food Science &
  Technology Abstracts
National Technical
  Information Science
  (NTIS)
PTS Prompt

Figure 5. *Life Science Network* scan results table.

```
PRESS  TO SEARCH                           Results  Format     Source Type

1      * BIOSIS Previews (BA) ............  66      abstract   journals
2        CAB Abstracts (1972-1983) ......  56      abstract   journals
3        BIOSIS Previews (BA/RRM) .......  44      reference  journals
4        CA Search ......................  36      reference  journals
5      * CAB Abstracts (1984-) ..........  36      abstract   journals
6      * Agricola (1980-) ...............  19      reference  journals
7      * Agris International ............  12      abstract   journals
8        BioBusiness ....................  9       reference  journals
9        Food Science and
           Technology Abstracts .........  7       abstract   journals
10       PTS PROMPT .....................  2       abstract   multiple sources
11       Dissertation Abstracts Online ..  1       abstracts  dissertations

         * Recognized source for information in this field.

H        Database descriptions
M        Main Menu
SOS      Online assistance

->
```

search system and database, and retrieve the relevant references. Records with abstracts can also be obtained. Access to *LSN* is via BT Tymnet, SprintNet, the CompuServe Network and the InterNet.

Using *LSN* has several advantages:

- Availability: it is available 24 hours a day, seven days a week.
- Simplicity: it is simple to use and requires little previous knowledge.
- Scope and coverage: there is a large range of databases available.
- Search assistance: online help is provided via various help screens and database descriptions, while the SOS facility provides personal online assistance. A question can be entered and an answer from a search specialist will appear on the screen. The BIOSIS Help Desks can also be contacted to resolve searching problems.
- Pricing: the price structure is results-oriented. Passwords are free and low cost automatic logon software available. The online connection charge is just $0.15 per minute ($9.00 per hour) via any of the access methods. Charges are then made as follows:
  - to scan a group of databases and receive the table of results – $2.00.
  - to search a particular database and retrieve references – $6.00 for every 10 references viewed.
  - to look at the abstracts (if available) – $2.25 per abstract.
  - to look at a full text article (if available) – $3.50.
  - document delivery – $16.00 (standard) or $39.00 (express).

Support services

So that users can make the most of BIOSIS' products, several support services are available:

- Search Guides: each of the online databases has a search guide which outlines coverage criteria and treatment of information as well as providing full details of the powerful retrieval features of the BIOSIS indexing systems. There are also search tips and sample search strategies.
- Serial Sources: details of the serials monitored for the *BIOSIS Previews* and *Zoological Record* databases are listed in the appropriate copy of *Serial Sources* together with their CODEN, abbreviated title and publisher address.
- Help Desks: for users in Western Europe and the Middle East, BIOSIS operates a European Help Desk in the UK staffed by Vital Information Ltd.
- Training courses: free training seminars are conducted worldwide for all the databases. Courses include Basic and Advanced (*BIOSIS Previews*), Med/BIOSIS, *Zoological Record* and *BioBusiness*.
- Newsletters: there are three newsletters which can be sent to users free of charge: *BioSearch*, the education newsletter details, database enhancements, training course information, and other news pertaining to the online and compact disc products; *BioScene* gives current information about *BIOSIS*; *Life Science Network*

News, as the title implies, gives information on the *Life Science Network.*

BIOSIS has now served the life science community for over 65 years. As new technologies emerge and the needs of its users change, BIOSIS intends to enhance its products to match those needs, and continue to provide the information required. Further details on any of the products or services mentioned can be obtained by contacting BIOSIS.

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◆ The share of Japanese databases in the number of databases available in Japan grew to 31% in 1989 from 25% in 1986

◆ Expenditure on foreign databases account for one third of total expenditures

◆ There were 172 Japanese databases available overseas in July 1990 compared to 28 in 1987

◆ Total revenues of the Japanese database industry amounted to 1,037 billion ecu in 1989

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CD-ROMs and beyond: buying databases sensibly?

Tony McSeán,
Librarian, British Medical Association

Paper presented at a joint meeting of the Aslib Biosciences Group and ALISSE entitled New Dimensions in Agricultural Information, held in Reading on the 1 November 1991.

Introduction

The purpose of this paper is to examine the reasons why CD-ROM technology has made such a widespread impact on libraries in the science, technology and medicine (STM) sectors, and whether, now and in the future, there are sensible alternative strategies which our profession should consider adopting. It will concentrate mostly on large, core bibliographic databases both because this area of the market represents the great volume of sales by value – and because it is the area I know best.

This paper is not anti-CD-ROM. Indeed one of its messages is that that sort of partisan statement is an inappropriate way of pursuing a technological and marketing debate. The BMA Library makes very full use of this technology: two public workstations running CD-Plus Medline, Hepatitis B and AIDS discs, dial-up access to Medline, and Maxwell's 5-year *BMJ* compilation soon to be installed on our LAN to support reference work. If we did not already have a Medline subscription, we would take out one tomorrow. Speaking personally, I am pleased with the cheap, short-term advantage (practical, financial and public relations) that my library has gained from diving into CD-ROM. I like the MS-DOS shareware and public domain program compilations, CD-ROM based games, the opportunities for distributing high-quality illustration and clip-art, programmers' libraries and workshop manuals. I dislike the excessive hype and evangelism, the amount of under-the-counter investment in specialist technical knowledge, the long-term commitment implied by the volume of investment required for networking and other mass implementations. To date I am underwhelmed by the CD-ROM book substitutes I have seen. When asked why we should buy the CD-ROM when we already had the paper copy, one publisher's rep could only come up with the benefit that it was much easier to find out when a topic was *not* covered.

Limitations of the technology

My views on the limitations of CD-ROM technology have been well aired, notably in the *LA Record* article that sparked off the controversy[1]: the data capacity is too small for most major databases, the drives' retrieval and data transfer performance is too small for adequate networking, the limitations of the MS-DOS environment restrict functionality and make installation a nightmare even for sophisticated PC users[2]. Systems that get round some or all of these imitations, such as the CD Plus Medline products, make heavy use of other mass storage technologies to achieve speed and flexibility.

CD-ROM systems are not necessarily good value for money either, if the total cost of hardware and software is taken into account. A routine PC clone still costs around £1,000; a CD-ROM drive is at least £300; the cost of a CD-ROM Medline subscription starts at around £700. Very few subscribers to Blaise-Line spent as much on accessing the BNBMARC file as they have on the CD-ROM equivalent. Comparing the cost of 4gigabytes of storage, single CD-ROM drives cost around £2,800 (plus the cost of linking them up); multiplatter CD-ROM towers cost £12,000 or more; conventional PC winchester discs cost £8,000[3].

A success nonetheless

With all these drawbacks, though, CD-ROM products have been the library success story of the late 1980s, bringing a good deal of new money into library purchasing budgets. Why? Well perhaps some of the reasons can be seen in the unpublished responses which Derek Law and I received to our original article. These fell into three broad categories.

The supplier's tale: To some extent this can be seen in Charles Chadwyck-Healey's short piece in the *Record*[4], notable also for its pioneering of the promotional footnote. Not all supplier's responses showed the charm and wit we expect from CC-H, but they all share the basic sentiment that here are all these lovely, saleable products and that the power of market forces is paramount in these affairs. My reaction to this is (a) good luck to you because making a living is tough at the moment, and (b) it is time for the buyers to redirect these market forces.

The enthusiast's tale: Things are good and getting better. This is true. CD-ROM drives' access times are a third of the time taken by early units, and system tweaking is speeding up other links in the chain. However, most of the tweaks reduce the role of CD-ROM technology; before long the tweaks will become kluges impossible to sustain in long-term product development; the basic characteristics of CD-ROM will never stretch to cope with proper networking.

The librarian's tale: To be summarized as: CD-ROM has expanded services to readers, been excellent PR, and brought in new money to the acquisitions budget. To some extent I agree. Where I part company is that I see these as essentially short-term benefits, to be left behind by new developments in a year or so.

As a profession we tend to be evangelical and heavily committed to the systems we buy. We also find it hard to come to terms with the speed with which technology changes. The evangelism is, I think an unattractive consequence of our drive to educate and communicate, our passion for co-operation and sharing. Our failure to run alongside technological change may result from the value of consistency and continuity to so much of our work: change carries a huge premium in many aspects of document organization. This is not a valid approach to microcomputing, where cost/benefit changes of 30% a year are routine, and where the front-line life of a computer can be measured in months.

What will replace the CD?

In terms of technology, I expect to see a continuation of the trend already identified whereby apparent CD-ROM-based systems make less and less use of the CD element. It will become rapidly more cost-effective for us to set up decent database systems based on mainstream technology. The key development is for database publishers to be convinced that they can profitably package products based on this concept – and sell them direct to individual libraries and library consortia.

Of course this is really a marketing, not a technological development, and can therefore take place even more rapidly. From the libraries' point of view, it requires a more detached perception of our purchasing decisions *and* smarter buying. We need to develop a built-in bias in favour of change: change of supplier, change of technology, change of service objectives. We need to learn where the tweaking has to stop and the sweeping away has to start. We need to take the lead in mixing a cocktail of technologies which will satisfy our professional vision of our users' information needs – and then "selling" our vision to those users. Already examples of that approach are bringing benefits – the £6,000 institutional subscription to the BIDS/ISI databases represent terrific value for money when compared even to ordinary CD-ROM workstations. The Medline initiative, with which the BMA has been closely associated is another example of what can be done.

CD-ROM in developing countries

All I have said about CD-ROM has been from the perspective of an established library in a reasonably wealthy country. Stepping outside the developed world, the picture can change radically, and CD-ROM can be seen to have advantages which may ensure its continuing usefulness. It can readily overcome problems of poor telecommunications, and of prohibitively expensive international phone lines. It can defeat crazy import restrictions and censorship, simply because the discs do not look at all like computer kit. There are already many stories of travellers jigging and humming their way through customs with one Medline disc in their Sony DiscMan and the rest in their jacket pocket.

The niceties of technological arguments mean less in famine conditions, and that is true whether the famine is related to food or information. Researchers in the developing world will use well-abstracted databases such as Medline as a substitute for the printed primary sources they have no hope of affording and no hope of managing properly even if they could be bought. The low-tech, low-performance nature of CD-ROM may be of less importance; the inefficient use of staff time may be less crucial.

Finally, CD-ROM products are something decent which it is fairly easy for the North to give to the South. Perhaps it is really just a fancier example of the old phenomenon of the rich passing on to the poor the remnants of passed-over technology, but at least this time these remnants are likely to be complete, manageable and supportive of the information worker's importance in the research and clinical worlds.

Conclusion

To end on a suitably sour note, though, I am increasingly convinced that CD-ROM is second-rate, Ratner-grade technology. Its usefulness is as large floppy discs, not as big, slow winchesters. Just like in the world of audio, it is a *producer's* technology – cheap to produce in volume, impractical to pirate. It has given us all a glimpse of the benefits to come from distributing and networking large databases, and will move quietly out of the way to let these benefits be properly and effectively exploited for the real benefit of our users – and our paymasters.

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Agriculture, food and biosciences information from SilverPlatter

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Paper presented at a joint meeting of the Aslib Biosciences Group and ALISSE entitled New Dimensions in Agricultural Information, held in Reading on the 1 November 1991.

SilverPlatter, a major publisher on CD-ROM, expects to offer over 100 titles on this medium by the end of 1992. Agriculture, Food and related Biosciences products account for almost 20% of this total. Close to one thousand major agricultural libraries and information centres around the world currently use these products. This paper first presents SilverPlatter: its objectives as an information publisher/distributor and the services it offers. It goes on to review SilverPlatter's agriculture related products, and closes with a look at the future in terms of both products and technology.

SilverPlatter's general objectives

First, what are we trying to do, and how are we setting about it?

As a developer and publisher of CD-ROM based information products SilverPlatter seeks to serve two constituencies: the database producer or information provider (IP), ie the data source; and the information user, ie the end market. Representing the supply and demand sides of the product, both are critical. Service of one is largely synonymous with service of the other. Either way the emphasis is squarely on *service* – on a SilverPlatter. We now analyse in more depth the perceived needs of these two constituencies.

Starting on the demand side, the user is foremost concerned with the *nature of the data* contained in the product. How relevant, comprehensive (generally a function of size) and complete (ie citation alone, with abstract, or the full text) is the data? Timeliness, a function of the updating cycle, can also be critical.

Next, and often as important for the user, is the *accessibility* of the information. Here we distinguish six key concerns affecting the software used to seek and deliver the data:

- *Ease of use* – the oft mentioned "user-friendly" objective, mainly dependant on the user interface;
- *Convenience* – ease of access for the individual, or how far is the nearest workstation;
- *Format friendliness* – relaxing with a book can be much more pleasant than sitting tied to a PC;
- *Functionality and flexibility* – the ability to perform a wide range of tasks;
- *Power or speed* – the time dimension;
- *Cost of the package*, including necessary hardware and network/communication charges.

Finally, the user will be concerned with a range of less visible, but as important, peripheral product support components. At its core will be a free hot-line service to efficiently resolve user problems with hardware, software, installation, updating, maintenance, use, etc. Also of relevance will be the efficiency, flexibility and reliability of the product supply and related subscription functions.

Turning now to the information providers, they are primarily concerned with effectively servicing the end-user. For them information is not a variable – at least in the short term – although user feedback will influence longer term database development. Different costs are involved, the IP being very concerned with royalties – typically a percentage. Other important concerns include: copyright and legal issues; data integrity; positioning with respect to complementary or competing products – either their own via different media, or of other IP's via the same CD-ROM medium; financial arrangements for payments; demands for IP support or commercial participation; public relations exposure; etc.

Meeting needs: The SilverPlatter service

SilverPlatter seeks to respond to its constituents' perceived needs through a five part service package.

First and foremost. Historically and in personnel investment terms – is software development: both existing product enhancement and new product development. The ninth major new release of SilverPlatter's DOS based software, SPIRS, occurred in early 1992. New features included: Multi-disc and multi-database searching, sorting of records, wildcard searching and Library Holdings. Mac and NEC versions of SPIRS are also available, and UNIX should follow soon. SilverPlatter has recently shipped its first Full Text products. Graphics will follow in mid 1992, part of a new SPIRS for Windows software package, which in time is expected to become SilverPlatter's main software vehicle. One major advantage of SilverPlatter's software is that it is common to all SilverPlatter published databases.

Second. The publishers role is a critical one at SilverPlatter. Enrolling information providers is the first key step in connecting information user and supplier. It calls for careful market research on both the demand and supply side to identify suitable publishing prospects. Strategic considerations must also be kept in mind when assembling portfolios of related but complementary products. Contract negotiations call for sensitive and creative exploration of areas of mutual interest. Agreements which effectively reflect the needs of both IP and SilverPlatter lay the guidelines or foundations for fruitful, trusting and expanding working partnerships.

Third. Design, Specification, Development and future Enhancement of our CD-ROM products is a specialist service calling for a unique alchemy of librarian and computing skills. The task involves effectively harnessing the power of the standard software packages to maximize user ease and power of access to the data. It calls for intimate knowledge of software, indexing and librarian skills, database characteristics and user needs. The IP is a key participant and contributor in this process.

Fourth. Production, Sales, Distribution and Financial services are sometimes overlooked elements of the SilverPlatter Service. Sales with its attendant activities of publicity, promotion, telemarketing, exhibiting, distributor network development and management, brings the product to the notice of the prospective user. This is a key service for both IP and user, and is vital to the publisher's commercial interest. Similarly the order fulfillment activities of disc/documentation production, updating and timely distribution provides the information–material link between IP, SilverPlatter and user. Financial services, covering invoicing, collection and renewals completes this key trio of complementary services. Meeting the special interests of IP's and users calls for an optimal mix of market orientation and sophisticated operating systems.

Last but not least is the most traditionally service-oriented element – Technical Support. This key back-up service provides a vital communication link between user, SilverPlatter and IP. It minimizes delays or interruptions in information services, and helps ensure optimal use of information products. It provides valuable market feedback on products, software and hardware. It extends naturally into user training. Maximizing user satisfaction offers significant pay-offs in terms of future market growth and hence IP satisfaction. As markets expand to less accessible regions of the Developing World, support problems become more necessary and more challenging.

The major bibliographic databases

Publishing the big three agricultural databases has been both a primary objective and a major accomplishment for SilverPlatter. The common interface offers users significant advantages. A comparison of the databases as they currently appear on CD-ROM illustrates their relative merits – see Figure. 1.

The three databases are roughly comparable in size, in terms of record numbers added annually. CABCD offers a vastly greater proportion of abstracts per record than the other two databases. However, the latter currently provide a complete archive on CD, going back to the early 1970s, while CABCD now starts at 1986. The AGRIS database carries more indexing data, automatically expanding controlled descriptors by adding broader terms, and in two additional languages: French and Spanish. AGRIS also carries non-controlled identifiers and subject category codes.

	AGRICOLA	AGRIS	CABCD
Information Provider	US – NAL	UN's FAO	CAB International
Time span(yrs):			
– full database	22	17	20
– on CD-ROM	22	17	8
No. discs	4	5	3
No. records			
– on CD-ROM (m)	3	1.5	1
– added per year	110,000	130,000	140,000
– % abstracted	15%	20%	85%
Thesaurus	CABVOC	AGROVOC	CABVOC
Uncontrolled descriptors	prior to 1985	yes	no
Subject codes	yes	yes	no
Language	English	English + tri lingual descriptors	English
Updating	quarterly	quarterly	annual
approx cost (US$/current yr)	$700 – 770	$750	$900-2500
Lease or purchase	Lease	Lease	Purchase

Figure 1

Unfortunately the database trio use different thesauri. CABI have long used their own very large CABVOC Thesaurus, with over 50,000 terms. FAO developed a simpler AGROVOC thesaurus. The second edition, just implemented, contains 16,000 terms. NAL elected to use CABVOC for its AGRICOLA database. Efforts are now under way to develop a single universal thesaurus which should much facilitate integrated use of all three databases.

Duplication of coverage is an obvious and oft-mentioned concern for users of "the big three". Numerous analyses have been conducted on this issue by both IPs and users. Estimates of the number of pieces of agriculture literature to appear each year range from 200,000 to 250,000. About 380,000 citations appear annually in "the big three". Assuming these databases cover all agricultural literature, about 160,000 or 42% of their citations must be duplicates. Eliminating the 40,000 citations NAL contributes directly to the AGRIS database, still suggests that about one in three records are duplicates. NAL are reducing this degree of duplication by cutting back their coverage of non-US literature. Similar co-operation between CABI and FAO seems more difficult to achieve for philosophical reasons.

To sum up, differences in database emphasis, design and coverage can be both useful and wasteful. Standardization in such areas as thesaurus use, subject coding, multilingualism, and duplicate elimination can provide added user benefits. Hand in hand with such improvements on the data side go a need for better access. Cross file searching, duplicate elimination, record sorting, large file handling, friendlier and selectable user interfaces, online connections and many other features can all benefit the user. They also can resolve some of the data problems.

Agricultural serials control

SilverPlatter have just published a small but very useful database entitled the World List of Agricultural Serials (or WLAS). Assembled by the US National Agricultural Library with support from CAB International, FAO and a number of other organizations, WLAS sets out to provide key bibliographic information for all agricultural serials – worldwide. It currently covers over 54,000 titles, indicating in which of "the big three" databases, if any, each title is indexed. NAL plans to update and expand this database, and invites the submission of other applicable lists for future addition to WLAS. The database can serve as a verification source for document delivery, a reference aid for serials selection and a tool for eliminating duplication in indexing coverage.

Information on agricultural research

While bibliographic databases essentially carry the results of agricultural research plus related commentary, other databases inventory and describe the research projects themselves. For these much smaller – so-called databanks – the basic record is a research project rather than a single bibliographic citation. Each project record may reference a large body of literature. Such databanks typically cover research projects for a specific country or region. Key information includes: project title, objectives and purpose, undertaking organization, researchers, funding, summary progress, results, references, etc.

CRIS, or Current Research Information System, from USDA's Cooperative State Research Service, is the largest and most developed of these agricultural research databanks. It contains about 24,000 active projects plus a further 10,000 recently completed, covering all aspects of agriculture, forestry and veterinary medicine, plus a subfile on nutrition. Each record describes what is being done, who is doing it, which organization, where conducted, when active, progress reports and publications. Well over 100,000 citations are included, many not referenced by other databases. A classifying system and controlled vocabulary are used for classification and indexing projects.

ICAR, or Inventory of Canadian Agri-Food Research, is a similar smaller databank of about 4400 agriculture, food and nutrition projects from federal and provincial organizations, universities and industry. SilverPlatter have recently merged these two databases and published them on a single CD-ROM. The product, entitled CRIS/ICAR, is updated annually.

Several other databanks provide valuable coverage of agricultural research in other parts of the world. ARRIP (Australian Rural Research In Progress) like ICAR, carries data on close to 5,000 research projects in the rather different climatic conditions of Australia. AGREP, another major agricultural research databank covering countries of the European Community, contains over 30,000 projects. Its content and quality are currently being upgraded and expanded. CARIS, FAO's agricultural research databank contains research project data submitted by member countries, primarily in the Developing World. It is of comparable size to CRIS and AGREP, but like AGREP suffers from problems of data quality and currency.

For the benefit of users, these and other similar databanks should be made available on CD-ROM. Duplication of information is not a problem since each databank has its own geographical area of coverage. There may be room for co-operation in keyword indexing, database design and content, etc. However, of greater concern is the basic problem of data quality and comprehensiveness. Research organizations are often not interested in collecting and submitting accurate information, or fail to see the need or value of such data exchange. Secrecy is a hindrance when reporting private sector research. But, the benefits of disseminating information on agricultural research must justify efforts to surmount these problems. SilverPlatter plans to expand its coverage of such databanks to meet user needs in this area. It will also seek to enhance its data access facilities in such appropriate areas as hypertext-type crossfile and inter-project searching and linkage.

Specialist areas of agricultural information

SilverPlatter's expanding agricultural product group includes a range of other more specialized CD-ROM products: both bibliographic databases and databanks. TROPAG & RURAL has particular relevance for the many Developing Countries located in the tropics, as also for institutions concerned with rural development in those regions. Currently about 100,000 references with abstracts, the database is expected to grow rapidly over the next few years with the addition of other complementary databases in land planning, natural resources, postharvest preservation, and rural health care – as well as from parallel french language sources. Studies indicate that TROPAG & RURAL contains much non-conventional literature, proceedings, reports, etc not referenced in "the Big Three Databases".

Crop Protection is another specialist area of agriculture. Currently SilverPlatter offers a twin databank product, Pest-bank, providng data on the composition, formulation, registration, manufacturers, hazard, action, of all US registered pesticides – both current and cancelled. It also indicates for which pests and crops or sites the pesticides are registered, and lists US legislated maximum permissible residue levels. Plans are in hand to expand coverage to other world regions. Also due out in mid 1992 is a new specialist product from CABI, entitled CABPEST, which will deliver on one disc all the information relating to crop protection from their database, back to 1972. It is expected to include over 300,000 records.

Two other CD-ROM products which are jointly published with CAB International cover the specialist area of Animal Science. These include: VETCD covering all aspects of veterinary science, and BEASTCD with complementary information on the animal production side. Both products cover the last twenty years and each offers about 300,000 bibliographic records with abstracts, currently updated annually.

Another in CABI's range of specialist CDs offered jointly by SilverPlatter is TREECD. This represents the world's most comprehensive source of information on forestry. It also covers agroforestry and forest products. TREECD provides over half a century of bibliographic data with abstracts.

Two further new specialist products to be published jointly with CABI in 1992 will cover the areas of horticulture and soils, water and irrigation. Both are expected to cover about 20 years of publication, and to appeal to specialists in respective topic areas. Like all other products in this series, they will appear on one disc and be updated annually. A second SilverPlatter product covering water and irrigation from a more general angle is *Water Resource Abstracts*. This bibliographic database from the US Geological Survey provides 250,000 abstracts, with thesaurus, covering the past 25 years, and is on one disc which is updated quarterly.

Food and nutrition information

Currently SilverPlatter's major offering in this key topic area is *Food Science and Technology Abstracts*. FSTA delivers approaching 400,000 citations with abstracts, covering the past 23 years. It is the product of co-operation between food institutes in four different countries. At present FSTA does not include nutrition, but these data may be added in the future. Sensibly this would occur via co-operation with CABI or all of the big three databases, hence minimizing duplication between them and FSTA.

Plans are in hand for publication of several other food and nutrition CD products. These should include a new database from BIOSIS entitled *Foods Intelligence* which will offer about 50,000 records per year covering all aspects of both food and nutrition from a scientific as well as commercial standpoint. A databank covering many aspects of all US-registered food additives is also currently in discussion with the US-FDA. Finally, mention should be made of the very significant CD products that SilverPlatter offers in the related areas of toxicology, health and safety. These include Toxline, Toxline Plus, CHEM-BANK, Medline, OSH-ROM, etc.

General biosciences information

Discussion of SilverPlatter's agricultural products would be incomplete without mention of the Biological Abstracts CD, together with its counterpart BA/RRM covering reports, reviews and meetings. Together these represent the huge BIOSIS database, known online as BIOSIS Previews. In aggregate, this product offers close to 600,000 abstracted and fully indexed citations each year to literature in all aspects of the life sciences. While much of the material relates to human medicine, much also is relevant to the more general animal science, and to plant sciences. It provides powerful and comprehensive underpinning to the more specific and applied agricultural information products.

Biotechnology Abstracts is another more recent and specialized addition to SilverPlatter's range of general bioscience-related information. This quarterly updated database from Derwent is fully abstracted and includes both patent and bibliographic information. Graphical data will be added in 1992.

Finally, a second new product from BIOSIS, which is expected to be added in 1992 is the venerable *Zoological Record*. Carrying unique information on this area of the biosciences, this product will cover up to 15 volumes on a single CD.

A look to the future

Ever more products will be published and distributed in electronic format – CD-ROM now, something better in the future. As secondary sources become available on CD, their print equivalents will disappear. Full text primary literature from print will also start to proliferate, and in time both literature types may merge as electronic capabilities expand.

On the technology side networking and connectivity appears to be the main thrust. SilverPlatter played a leading role here with the early development of its MultiPlatter product which permitted networking of all CD products supporting the ISO 9660 standard. This is now being taken a major step forward with the development of the Electronic Reference Library (ERL) software. This introduces Client/Server software which separates Interface from Search Engine. It will greatly facilitate networking large numbers of CD products across a wide user population, and the integration of LANs, wide area networks, hard disc resident databases, dial-in access, and more. ERL's use of client/server architecture will allow different types of client machine (IBM PCs, Macintoshes, UNIX terminals, etc.) to access the same centrally located databases. Accompanying software will permit usage measurement and control, improve security, and help tailor data supply to demand. It will make searching across a wide range of databases, which can also be very large, both faster and easier.

This leads into another important technological development that SilverPlatter is supporting – the establishment of a Data Exchange Standard. This will permit organizations to standardize on the same user interface for accessing information products from different vendors who support the standard. Significant savings in administration, installation, training, support, documentation will result. Alternatively organizations will be free to offer their users a variety of interfaces and platforms for accessing the same database. The standard will encourage the development of ever better user interfaces. Both databases producers and users, as well as the industry as a whole will benefit as occurred in the case of the High Sierra / ISO 9660 standard. It seems very likely an ISO defined Data Exchange Standard will emerge within the next two years.

In conclusion let me outline a significant new product that SilverPlatter is about to bring to market. Like all such it has a catchy acronym, "AgRIC", standing for Agricultural Reference Information Centre. It will consist of a combination of CD-ROM products, specialized software and hardware. It is designed to meet the information needs of any major institution involved with food and agriculture. This will include the large agricultural universities, the major agricultural research organizations and institutes worldwide, major government departments and ministries concerned with agriculture and/or food, appropriate multinational organizations, etc.

AgRIC will seek to meet the six or seven user needs outlined at the start of this article. The emphasis will be on tailoring the product to the specific requirements of each user in terms of databases available, size of network, user numbers, demand and service levels, system software and functionality. Hardware options can start from a simple multi-drive/multi-workstation network, and build up through the addition of extra servers/drives, high capacity hard disc storage, dial-in access and wide area network connection. As SilverPlatter's specialized ERL software becomes available, and when its DXS proposals take root, the respective set of benefits of each, as described above, will also be added to the AgRIC product to expand its functionality, power, applicability and ease of use.

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CAIN, a Computer Assisted INdexing system.

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Paper presented at a joint meeting of the Aslib Biosciences Group and ALISSE entitled New Dimensions in Agricultural Information, held in Reading on the 1 November 1991.

The CAIN indexing system was demonstrated. This paper gives some details of the operation of the system and some comments on the practical and theoretical background are made.

Introduction

The Commission of the European Communities maintains a list of current agricultural research projects taking place within the member states. The database is called AGREP and is available in printed form and online from the Euro-Agrep host. The Data set provided by the countries for each project consists of a minimum of identifying number, title, leading worker and a location. In addition an abstract, keyword chosen from AGROVOC, additional workers and cost estimates can be provided. The projects are indexed with the classification system originally developed for the Netherlands national system. There are four facets. The A facet which identifies the purpose of the research (this field is not widely used). The B facet which is the subject of the research. The C facet which is the field of science. And the D facet which is the area of agriculture. Up to four A,C, and D facets and up to 11 B facets can be assigned. These codes are used to lay out the printed version, and, increasingly, to divide the projects up into broad categories for research management and to form the first step in online searching. This indexing is done, in the main, by contract indexers. To improve compatibility with the FAO system CARIS, and to improve free text searching it has been agreed to add AGROVOC keywords, where they are not already provided, and the AGRIS/CARIS classification codes used in the FAO databases (AGRIS for documents and CARIS for projects). To make the indexer's job easier, and to remove the need to keyboard from data sheets, a Computer Indexing system is being developed by Datacentralen, the contractor for the AGREP project.

The system

Data is accepted in comma file format. That is, the various text and coding fields are identified by commas with empty fields indicated by two commas. This is a very adaptable method of transferring data. The data is presented as a scrolling screen for each project. The data handling and presentation has been developed using C-Scape language. The system checks the text for terms in the CAB thesaurus and uses a conversion table developed for the conversion of AGRICOLA input to AGRIS input by the AGRIS Centre in Vienna. Plural and singular forms are checked. The terms are then converted to the nearest AGREP Facet Code using a lookup table. At this stage the majority of assigned codes are from the B and C facets. The D facets, and then the A facets are derived by checking the codes against a table of Boolean constructions. The AGRIS/CARIS codes are derived from the AGREP Codes (excluding the A facet) using another lookup table. Finally some broad Programme Analysis Codes, used by the CEC in strategic research planning are derived in a similar way.

At each stage the indexers are free to override the system and add their own choice of codes. They are also free to ask "what" of any code or "how" of any logical step. The tables of codes can be called up and terms chosen by point and click with the mouse (or cursor and enter for the mouse-less). Deletion of unwanted terms is also easy. Once indexing is complete a comma file is generated.

The text and table handling is completely separate from the contents of the tables and rule sets. The system could be adapted for any other system where terms and combinations of terms are converted to a more generalized coding. There is, in theory, no limit to the length of the rule set tables. Currently there is a limit to the length of the rules and an upper limit on the text length. Large texts and long lists of rules do slow the procedure down.

The semiotics

The coding system was developed in the early seventies when the aim of agriculture was to produce food as efficiently as possible. The logic of the rule sets follows this approach. It is assumed that food is produced from animals that eat plants that grow in the soil. At any point in the process pests, diseases, climate or other external natural factor will affect the process. Similarly various machines, buildings and processes will be applied to the system. All this takes place in the context of agricultural economics and sociology.

The rule set is based on this simplified model of the agricultural production system. For example, if the text includes a cow and grass it is assumed the cow eats the grass, and the code for animal nutrition is generated.

How well does it work?

In those areas of agriculture that fit the model of agriculture used as a basis for the codes, CAIN is nearly 100% successful. As one moves away from this into areas of conservation, and rural habitat the success rate drops, but, in these areas the coding system is stretched to its limits anyway. In my experience given a reasonable input text it takes between a fifth and a third of the time to code a project as it does looking up the codes manually. I have compared this both when indexing with my actual knowledge of the coding, that is knowing parts of it off by heart and being fairly sure of other areas and only needing to check the exact code number, and as a completely new indexer looking everything up. As well as the time saved for the indexer there is a saving in inputting the data to the main computer. Errors are reduced. The AGROVOC terms are gained with little extra effort.

Why does it work?

The key to the system is that the codes generated are more general than the terms in the text. The indexing is, in effect, paid for by loosing the detail. Another factor is the step-wise approach. It is not possible to go straight from the text to say the AGRIS/CARIS Codes, although the human indexer would probably assign the most general code first. A version of CAIN has been produced for the National Agricultural Library of the United States to index AGRICOLA. They only need the CAB thesaurus terms and an expanded version of the AGRIS/CARIS codes, but the B, C and D Agrep codes are generated as operational steps. The look-up tables and the rule sets have been written and checked by people with a knowledge of agriculture and the programs have been written by computer experts. To develop an expert or partially expert system requires experts in the subject as well as in computing.

What next?

The rule set will continue to be updated as new terms are added to the thesauri and if there are any modifications to the coding systems. The possibility of generating more than one code from the original words is being investigated. However, it is known that this will require major changes to the programs. Improvements will be made to screen and operational ergonomics. More sophisticated language handling may be introduced.

Credits

The programs are produced by Thomas Kåber of Datacentralen and the rule sets are written by me, originally whilst working at the Agricultural and Food Research Council Central Office (the UK AGREP input centre). The original coding system is the responsibility of Aad van den Berg of the Nationale Raad Landbouwkundig Onderzoek in den Haag and his advice and help in the construction of the rule set is greatly appreciated. All of us involved in the project are grateful to FAO and CAB International for permission to use their thesauri and the conversion table. The project is managed by Torben Friis and funded by the CEC DG/VI-the agricultural directorate.

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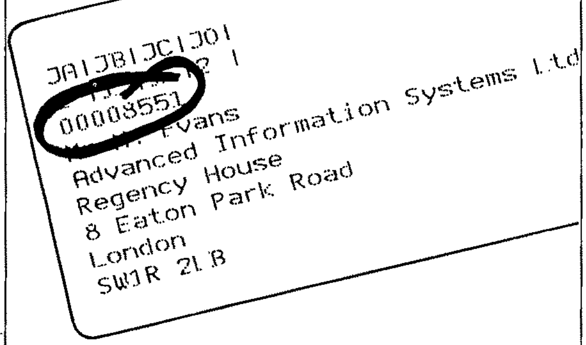

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UPDATE: the farming and countryside index of the Welsh Agricultural College.

Ann Evans
Joint Library of the Welsh Agricultural College

Paper presented at a joint meeting of the Aslib Biosciences Group and ALISSE, entitled New Dimensions in Agricultural Information, held in Reading on the 1 November 1991.

Update was started by the library staff of the Welsh Agricultural College (WAC) in 1974 to fill the gap in the information services provided as there was no comparable system to CAB for practical agricultural literature. It aims to provide a current awareness service, and also to create a database for the retrieval of information by specific subject headings. Unlike CAB it is not aimed at the scientific researcher, but at students coming to grips with the subject, often for the first time.

A significant improvement was made in 1983 when Norma Wells, now the College Librarian, produced the first computerized version and established the link with the University College of Wales Aberystwyth (UCW). Previously the information had been filed on 5" x 3" cards with a weekly typed list, but this step enabled the library to provide – as well as the weekly current awareness printouts – monthly, quarterly and annual cumulations. The printouts were rather crude, being on continuous computer paper and with subject headings repeated for each entry. They did, however, form the basis of the present commercial operation and the library started offering photocopies of articles on request for paying customers. This initial database was produced using the Famulus software package and UCW's Honeywell mainframe computer, and all printing was done by UCW.

In 1986, mainly as a result of an HMI visit, the College received a Welsh Office grant for three years to improve the service, as it was felt that other Colleges in Wales teaching agriculture should benefit from the service. This grant paid for equipment, and more particularly staff, which facilitated a number of improvements in format and production techniques. By 1989 the present format had been established and Figure 1 shows a typical page.

Update is still produced weekly with monthly, quarterly and annual cumulations, but it is now produced entirely by the College library staff using two micros, a VigII 120Mb and a Packard Bell 60Mb, and a TI laser printer. The software used is dBase III plus and Pagemaker 3. Famulus and UCW's new DEC mainframe are still used to produce the annual, but all the printing and photocopying is done at WAC.

Entries in the index do not contain authors, as many of the articles indexed are from the popular farming press. Coverage includes journals (approximately 630 are scanned regularly), press releases, pamphlets, statutory instruments, annual reports and much grey literature such as the National Agricultural Centre conference papers. Subject coverage now includes countryside management, equine studies, fish farming, forestry, planning, poultry, and recreation and tourism as well as traditional agriculture. This coverage has been greatly enhanced by indexing contributions from the following colleges who supply entries from their own specialist subjects:-

Harper Adams Agricultural College
Hertfordshire College of Agriculture and Horticulture
Royal Agricultural College
Silsoe College
Somerset College of Agriculture and Horticulture
Warwickshire College of Agriculture

The only limitation is that coverage is confined to temperate climates. The Royal Agricultural College provides a similar publication covering the tropics.

At present the service is widely used within the college by staff and students. The indexing terms used are from a Wordlist which is constantly improved and amended. The terms are based wherever possible on those used by the lecturers and are therefore more familiar to the students. This makes it easier for them to use and enables the library staff to cope with a great many common enquiries simply by advising on its use. As much student learning is now project-based this adds a learning dimension as well as freeing library staff to cope with the more difficult enquiries. This aspect is also the justification for the amount of time spent by staff on indexing and production. Without Update the library would not function with, as is often the case, only one professional on duty at a time.

The commercial part of the service has been very successful and the income covers all the production costs, i.e. materials, equipment and staff, with a modest profit for the College. The professional time spent indexing is not included as some form of information retrieval would always be necessary. Indexing time is also recouped by savings in search and enquiry time as many staff and students now help themselves.

Organizations using the service include the Ministry of Agriculture Fisheries and Food, the Meat and Livestock Commission, universities, other agricultural colleges, and some colleges of further and higher education. The backup provided by the document delivery service which has grown with the enterprise

Aslib Proceedings, vol. 44, no. 6, June 1992. pp. 253 – 255

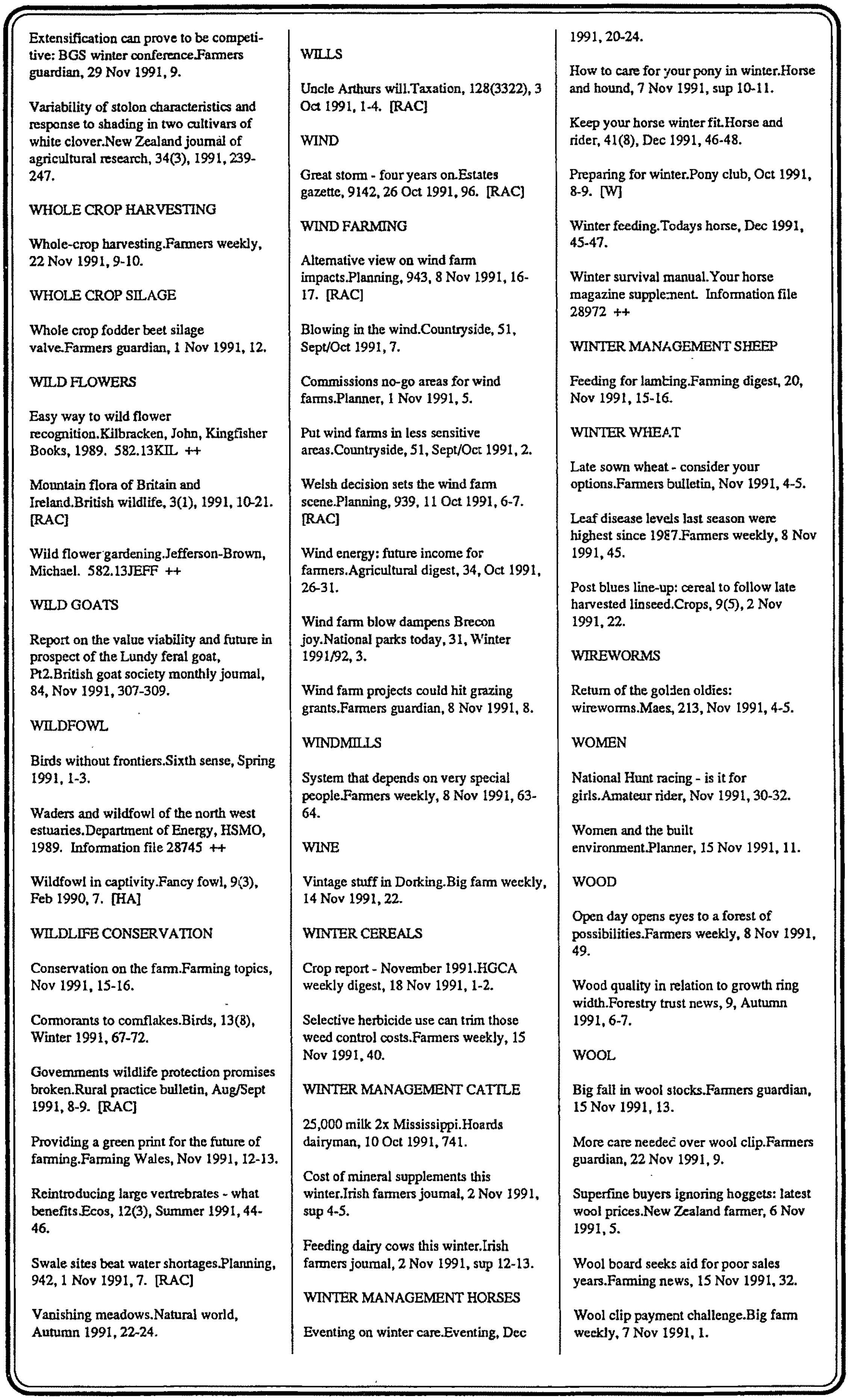

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Figure 1. UPDATE: the farming and countryside index 3(11)

is very important. Requests are always dealt with on the day they are received and sent out by first class post or faxed if needed urgently. In 1991, Update contained 31,015 entries, representing approximately 20,000 articles. Figure 2 shows the growth since computerization.

As far as the future is concerned the library is now investigating the possibilities of providing the service either online via Janet, or on discs. The library is fortunate in that it also serves Coleg Ceredigion, a college of further education on the same campus. A new database JOLI (the JOint Library Index) has now been started using the Update setup and covering such subjects as Computing, Economics, Health Studies, Psychology, Management, Office Practice, Sociology and Welfare, and it is hoped this will expand.

In conclusion, we feel strongly that with the current emphasis on generating income, we have demonstrated with Update how a relatively small library can exploit its expertise, and can also make a contribution to the information world.

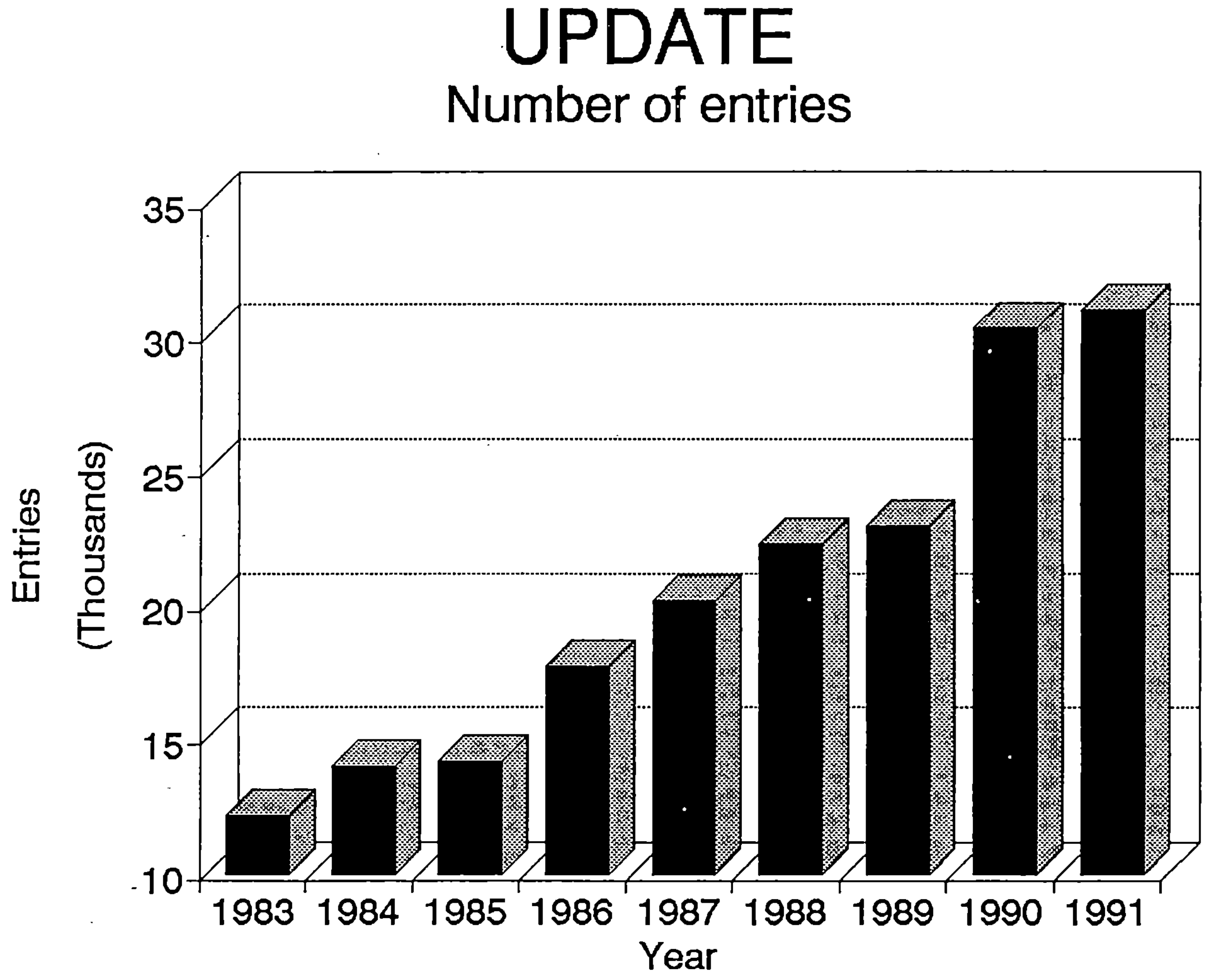

Figure 2. UPDATE Number of entries

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Information UK 2000: Education and training

Sylvia P Webb

Paper presented at the Information UK 2000 Seminar held at Aslib on the 13 September 1991.

As a participant in the original research for the British Library's IUK 2000 project, my general brief at that time was to look at the influences on, and developments in the management and organization of UK special libraries in the year 2000. The Task Force of which I was part had as an overall title "Archives, libraries and information services". I started by taking as a model Peter Drucker's view (1) of corporate economics in the 1990s and the far-reaching changes which he saw as being brought about in the social and economic environment. The main trends as seen by Drucker relate to increased international co-operation and integration; radical business restructuring; and a challenge to the doctrine of self-perpetuating management, raising questions of accountability.

These trends could all be recognized as existing in the world of library and information science, with its rapid increase in the use of technology, facilitating not only the management and exploitation of information, but also increasing the opportunities for worldwide communications and co-operation. Libraries too are undergoing restructuring and library managers are certainly being called upon to reconsider their roles and also to become more accountable. Performance measures are being drawn up for library and information staff, objectives are being set for library and information services. The call is for cost-effectiveness, efficiency, constant review, and, most important, new ideas. De Gennaro (2) sees the greatest challenge facing library leaders as that of being able to 'implement new entrepreneurially-oriented management structures and cultures in our ailing industrial age libraries'. All these developments suggest the need for a fresh look at corresponding education, training and in particular continuing professional development at all levels and in all sectors of the library and information profession.

The IUK 2000 report (3) presents the collective reports of the eleven task forces as separate, often quite brief, chapters. However the more detailed individual papers produced by each participant within the task forces are available through the British Library. Each task force was given a different aspect of the library and information profession to look at, but not surprisingly education and training issues were raised by a number of them and are therefore scattered throughout the book and not always readily identifiable through the index. What the report does, however, is to provide a stimulus for debate and subsequent action by members of the profession. Despite the considerable emphasis on information technology, the report implies a number of areas for action in all aspects of professional education and training.

My own response has been to look at what currently exists on the education and training front and try to establish what needs to exist in the future. Currently in the UK initial education required to enter the profession could be summarized in Figure 1.

INITIAL EDUCATION FOR ENTRY INTO THE LIS PROFESSION

- LIS degree
- Non-LIS degree
- Experience
- Professional Development Report leading to chartered membership of the Library Association
- Membership application to the Institute of Information Scientists

Figure 1

These may be closely linked with, and supported by memberships of the professional bodies and their various activities. They thus provide the foundation for both further formal education and advanced levels of membership such as Fellowship.

The next stage of formal education focuses on higher degrees and other advanced study as shown in Figure 2.

ADVANCED LIS EDUCATION

- Higher degrees
    - Masters or Doctoral level
        - LIS or Non-LIS focus
- Research

Figure 2

Although the two stages outlined above are based on formal education, their pursuit will certainly form part of the LIS professional's longer-term personal development. This will also involve continuing education and training of a task or skills-specific nature, which may be provided internally or externally, and all of which takes its place along the continuum of personal and professional development.

Aslib Proceedings, vol. 44, no. 6, June 1992. pp. 257 – 259

So where does this lead us in terms of the future education and training needs of the LIS profession? One area which is receiving considerable attention across the whole field of further and higher education, is that of access to, and support for education, training and development activities, as well as their methods of provision. These involve employers just as much as educationalists. Employees need support in terms of the whole organizational ethos surrounding education and training, its encouragement and the facilitation of its pursuit as well as any necessary funding.

The schools or departments of LIS studies will need to cater for the markets of the future, including any new or changed elements of the LIS professional role. The expectations of future LIS professionals will be based on a broader perception of the role. Increased emphasis on the importance of management and decision-making skills, as in other professions, will lead to expectations of higher level involvement in the shaping of policy at both local and national level. The educational institutions are introducing much more flexible methods of provision e.g. the modular approach as provided by the Credit Accumulation Transfer Scheme (CATS), part-time and full-time courses, distance learning, increased use of technology, as well as taking into consideration the special needs of various groups of society.

This is likely to be the direction in which education will be developing and with it professional bodies of all kinds will be needing to re-think their requirements, both of the educational institutions and of their memberships. In addition they will have to look at the range of support services which they will need to provide to meet the new demands of members in respect of education and training, whilst continuing to maintain and enhance professional standards and recognition. Professions can no longer act in isolation when there are so many common areas of interest in which they could benefit from discussions across the professions. Nowhere is this more apparent than in the field of professional education, and in particular continuing professional development (CPD).

My own recent research (4) highlighted the benefits to both individuals and employing organizations of a cross-disciplinary approach to CPD activities. Plans by employing organizations for increased international and European activity had heightened awareness of, for example, foreign language requirements, the effective use of new media, and generally the need to think more globally. These are equally applicable across the professions and throughout each employing organization, whatever the specialist function of individual employees. They are all part of the total organization and need to be aware of that if they are to make the maximum contribution to its activities. In doing so they are likely to add to their own knowledge, share it with others and also experience considerable job satisfaction. The research also underlined the increasing recognition of the importance of training and education at all levels through the appointment of senior executives at Director or Partner level to take the training and education function forward.

The critical importance of continuing education to LIS professionals around the world is well demonstrated in a recent IFLA guidebook (5), which includes commentary and examples of current programmes as well as anticipating future important changes. The paper by Boaz outlines necessary changes in educational requirements, suggests continuing education activities, promotes a research agenda along with suggestions for appropriate funding, and calls for expanded leadership. Appendix A looks at the resources for continuing professional education in the United States of America, and cites areas of focus for CPD of librarians as including:

- the use of variety and mixed learning modes;
- co-operative programme planning that involves employers, educational institutions, professional and other associations;
- formal courses that meet expressed needs for information and management technology;
- greater personal and institutional investment of time and money in continuing professional development.

These areas of focus are those identified in Broadbent and Grosser's study (6) of 85 Melbourne based special librarians and information centre managers to determine their needs, aspirations and professional development activities.

Appendix C of the IFLA guidebook sets out the guidelines adopted by the American Library Association Council in 1988, to promote quality in continuing education for library, information and media personnel. The appendix lists the criteria against which quality can be measured under five headings:

- group programmes and activities
- individual programmes and activities
- instructional materials and technologies
- continuing education providers
- learning consultants for individualized continuing education programmes

The adoption of similar guidelines should receive careful consideration by UK professional bodies.

My own research to which I referred earlier looked at CPD for LIS staff operating in UK professional firms where the major discipline relating to the firm's area of expertise was not in the information field. The study focussed on firms offering accounting, legal, architectural, engineering and other professional services. Related professional associations were also surveyed. Against this broader backdrop it was therefore possible to look at the requirements of other professions and the way in which they operate, the guidelines provided, and the activities offered, and to see how these might benefit the LIS profession.

It is only by taking this broader perspective and adding an international dimension that the UK LIS profession will develop the educational and training programmes and activities that are required to take the profession forward to make a full contribution to the educational, cultural and technological needs of the 21st century.

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Information UK 2000
The world we'll be living in

Patricia Stoat
Tyne and Wear Chamber of Commerce

Paper presented at the Information UK 2000 Seminar held at Aslib on the 13 September 1991.

Information UK 2000 is a stimulating and valuable study which ranges widely over the issues confronting information professionals as we approach the 21st century. Parts of the report are repetitive, for certain critical issues cannot be avoided: information work will be more international in scope after 1992; both hardware and software for information handling will become more sophisticated; attracting, developing and retaining the best people will become more difficult. Despite this, British Library Research deserves our thanks for undertaking and publishing this study, as does Aslib for inviting comments, and hosting this conference.

'It is clear' says Information UK 2000, 'that librarianship and information science will be dominated by technology'. Now this was certainly true in the 1980s. Bibliographic databases, company information online, financial and market databases and the invaluable press databases grew in number and size as suppliers converted to computerized systems and found ways to sell their product several times over and in a variety of formats. The 80s boom in the financial markets, itself technology driven to a great extent, created strong demand in a small (but rich) sector of the economy for information products. But only recently Anthony Harris, writing in the *Financial Times*, quoted a stockbroker complaining 'now I can get any amount of facts on my screen; but I don't *know* nearly as much as I used to...' and commented that the information age may be in danger of becoming an age of ignorance and guesswork. Even today much information is:

- difficult to find
- disappointing – incomplete, irrelevant – when found
- not to be relied upon
- expensive

Can it be that we have relied too much on technology in the past decade? Is it time to think again about what the technology is for?

Information UK 2000 enjoys technology and has much to say about it. But the authors admit that use of sophisticated IT systems to access, retrieve, store and add value to information is confined to a tiny proportion of businesses in the UK, mainly very large firms, or firms in sectors where real-time information is vital to keep pace with competitors: travel agencies, hotel groups, supermarkets. These are sectors where accurate data available at the touch of a button really does facilitate a better service to more customers.

Penetration of other sectors by sophisticated information retrieval techniques is much lower. *Better Made in Britain*, is a recent report into the use of information by the purchasing officers of major UK businesses [*Information Sources on UK Suppliers* by John Cohen, June 1991] found that only 25% ever used online databases to find information, while the majority relied on two or three directories. Over 80% of the purchasing officers questioned said that they would welcome guidance on what information is available: but the report makes it clear that what the purchasing officers (98%) really want is information on capability and quality. And this is not available – not online, and not easily in any form. Why not?

Information UK 2000 recognizes the existence of this problem of 'information poverty' in UK business, or rather recognizes the possibility that it will become a problem. As an information broker to the small business sector, I believe it is a problem already.

I recently made a site visit to a company which makes seats for the motor vehicle industry. It was a good visit, we were guided through the operation by two senior engineers. Did they enthuse about their state-of-the-art CAD/CAM systems? No. Did they boast that they are a demonstration site for advanced manufacturing techniques? No. Did they describe their materials resource management program? They did not. They talked about bodies, and about what bodies need from car seats. They talked about tension, stress, pressure points. They talked about how to design seats to keep drivers awake, passengers relaxed, children safe. They talked about the needs of their customers.

The users of information services seem to me to be absent from Information UK 2000, and this highlights our major weakness as a profession. We pay too much attention to systems, too little to how we use them. We are absorbed in our toys, and forget that they are the tools of our trade, a means to an end, not the need itself.

'Introduction of new technology products' declares Information UK 2000,' depends on the will and ability of users to support them'. This seems to me to be putting the cart before the horse: if we devise products which are relevant to our users, and useful to them, and which offer value for money, then the products will be successful. If we do not, they will fail, and it will serve us right for not doing our market research. Our users are under no obligation to take what they're given if they don't want it, and certainly under no obligation to pay!

I would suggest to you that the 1990s is the decade in which the information industry will abandon its romance with speed and size, and refocus on the *quality* of its products and services and the value-for-money that they offer. Quality will involve sensitivity to user needs, as well as a more critical approach to information sources.

Consider the problem facing a small firm in the North East trying to find out whether it is affected by the new German packaging regulations.

The firm might turn to:

Training and Enterprise Council
Enterprise agency
Euroinfo Centre
Public library
Chamber of Commerce
DTI Regional Office

Too many are signposting services ie do not in fact provide information, or provide a limited range of information, or provide only information when what is required is both information and guidance on interpreting and using it.

As our horizons expand in the 1990s, as Europe becomes our home market, as the range of public domain information becomes wider and more complex the skills we require will have as much to do with evaluation, interpretation and counselling as with storage and retrieval of information.

Can the public library system be expected to cope with the demands of an older, more discerning and value-conscious population, with providing business information services tailored to the user's business, with students of all ages undertaking complex projects?

Information UK 2000 refers often to the need for damage limitation exercises to protect the national and public library services from the effect of spending cuts. Boldly, it suggests that charges for most services will be accepted by the end of the decade. I would go further: has the public library in its traditional form outlived its usefulness? I would question not only whether the public sector with limited resources available to it can ever provide the quality of service that will be necessary to support information users by 2000, but whether it should even attempt to do so.

School, college, local history, business, technical and train-spotter's libraries with expert staff supported by systems with 'expert' interfaces to admit users to the information maze and guide them to the knowledge they seek...could this be the pattern of library services in the next century?

Sophisticated systems will undoubtedly be central to the development of the information industry in the 21st century, but only those systems will succeed which respond to the needs of users and are perceived to be cost effective. Skilled, expert and understanding staff will be as important as the systems. In two decades we have moved from documentation to information: in two more, will we have moved from information to knowledge?

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ELECTRONICS GROUP CONFERENCE 1992

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Technology assessment in Parliament

VGI Deshmukh and MG Norton
The Parliamentary Office of Science and Technology (POST)

Paper presented at the 34th Annual Conference of the Aslib Electronics Group at Danbury Park, Chelmsford, 14-16 May 1992.

Abstract

The Parliamentary Office of Science and Technology (POST) was set up in 1989 to provide members of both Houses of Parliament with objective information on scientific and technological issues. In this paper, the concept of 'technology assessment' is explained, together with details of POST's formation and mode of working. Finally, two recent papers from POST on The Relationships between Defence and Civil Science and Technology, *and on* High-performance Computing, *will be briefly discussed.*

Introduction

In the last few decades, science and technology have come to play a pivotal role in the developed nations, from economic performance to national defence, and from the health of the populace to the environmental impact of industrialization. With such a pervasive influence, it is inevitable that scientific and technological issues have found their way into the debating chambers of national legislatures around the world. These debates may themselves be as wide-ranging as their subject matter; for example, a new law might have to be passed to control pollution; or decisions might need to be taken on ethical problems, such as the use of human embryos in research.

How are such debates to proceed in an informed manner? Politicians tend to reflect those they represent, and just as scientists form a minority in society, so too are there relatively few scientifically-qualified politicians. Even in the academic world, experts in different disciplines may find it hard to put across their specialisms to each other, let alone to a lay audience. But these scientists could at least try to communicate without the pressures that face the modern politician, who, apart from dealing with constituency and parliamentary affairs, is bombarded with copious literature from modern-day interest groups. For these reasons, legislatures in several nations have sought to establish institutions that can serve their specific needs in science and technology, in particular, for rational and unbiased appraisal of scientific issues. This need is crystallised by the term 'technology assessment'.

Technology assessment

Scientific issues of today are so multifaceted that a wide spectrum of opinions voiced by both experts and non-experts alike is almost unavoidable. Technology assessment is designed to provide a mechanism of objective appraisal, and also a way of identifying possible solutions to complex problems. Technology assessment can be either narrowly focused on a single scientific issue, or widened to include social and economic considerations. Within this broad shading of science and society, any technology assessment must always be balanced in opinion, thorough in scientific content, objective in outlook, and of contemporary relevance. This means that technology assessment must lay out the facts, point out areas of disagreement, and identify possible policy options and their potential implications.

The first organization set up to satisfy these functions was the Office of Technology Assessment (OTA) in the USA, established in 1972. Since then, several European countries have followed suit as *Table 1* shows. Though different countries have different governmental and parliamentary structures, all the technology assessment organizations shown in *Table 1* share the common feature of being non-partisan and are run by boards consisting of representatives from

Table 1 Technology Assessment Organizations

Country	*Established*	*Name of Organization*
USA	1972	Office of Technology Assessment
Germany	1983	Parliamentary Committee for Research Technology & Technology Assessment
France	1983	Parliamentary Office for the Evaluation of Science and Technology Choices
Denmark	1985	Danish Technology Board
Netherlands	1986	Netherlands Organization for Technology Assessment
(European Parliament)	1987	Science and Technology Options Assessment
UK	1989	Parliamentary Office of Science and Technology

all parties and, where appropriate, from upper and lower chambers.

The three areas where technology assessments are most used are in:

- assisting legislatures to make independent assessment of government policy on a particular issue. This can be described as an 'oversight function',
- providing independent analysis on topics where new or amended legislation may be required (the 'legislation function').
- encouraging wider discussion of scientific and technological issues in the public domain. The fact that technology assessments reflect a wide range of scientific views can stimulate discussion between 'stake holders', politicians, etc., and generally broaden debate and appreciation of views. This capability of technology assessment is generally referred to as the 'outreach' function. In practice, technology assessment offices find that the outreach function gives a significant added value to their parliamentary roles. But note that it is *not* part of the role of technology assessment organizations to make recommendations, only to analyse issues and present possible options for parliaments to consider.

The Parliamentary Office of Science and Technology

In the 1980s, a number of MPs and Peers saw the need for a technology assessment body along the lines of those in other countries. A delegation, led by Sir Ian Lloyd, MP, raised the prospect with the then Prime Minister, Mrs. Thatcher, in 1986. The PM declined to support such a venture from public funds but suggested that an initiative might be started under the auspices of the Parliamentary and Scientific Committee. The "P&S", as it is familiarly known, is an unofficial committee comprised of MPs and Peers of all parties, scientists and industrialists, who meet regularly during parliamentary sessions to discuss scientific topics of interest. However, the P&S has no resources of its own to undertake detailed technology assessments. With the support of the members of the P&S and considerable efforts by a number of Parliamentarians, POST was established as a charity in 1989. Finance was gained from learned societies, such as the Royal Society and the Fellowship of Engineering, charitable foundations, from academia, and individuals. POST is run by a Board consisting of Parliamentarians aided by a panel of distinguished scientists. Further details of POST's sponsors and Board Members can be found in the latest Annual Report[1].

The initial funding of POST enabled a trial operation to be mounted for two to three years so that Parliament as a whole could assess the value of an organization like POST to the parliamentary process. Recently, a formal enquiry held by the Information Select Committee[2] recommended that POST should receive public funds from April, 1993 and this recommendation will be considered by the new Parliament after the April 1992 General Election.

Though POST has only a small core team, it can tap into the expertise of the entire scientific community in the UK, whether in Government, academia or industry; often, members of the P&S provide the initial expert contacts. Indeed, the requirement to produce balanced, factual evaluations means that all 'stake-holders' in a particular topic must be contacted, and peer review is used extensively for all POST's publications. This ability to harness a wide range of expert opinion gives a high added-value to POST's output.

POST's publications are of three types:

1) *Briefing Notes.* These are succinct accounts, generally four pages, of the issues surrounding particular scientific and technological topics – a list of those produced in the last year is given in *Table 2.* Brevity is important because politicians are very busy people and anyway, as Lewis Caroll once observed: 'There is nothing so worthless as a map laid out on a one-to-one scale'!

   Subjects may be chosen because a briefing note can aid primary legislation (eg. the flotation of the British Technology Group) or to raise parliamentary interest in Government policy on a certain matter, such as BSE. Finally, the Board of POST may feel that an issue may be deserving of parliamentary attention at some near date in the future. An example here is in safety-critical software which is increasingly used in complex computer-controlled systems, from fly-by-wire aeroplanes to automatic shut-down systems for nuclear reactors.
2) *Technology assessments.* These are in-depth documents which cover the complex issues inherent to many scientific and technological

Table 2 POST Briefing Notes Issued in 1991

No.	*Month*	*Title*
20	Jan	Safety Critical Systems
21	Feb	Oil Fires in Kuwait
22	Mar	British Technology Group
23	Mar	Oil Fires in Kuwait – An Update
24	Apr	High Definition TV
25	May	World Population
26	June	Patenting Life
27	July	Microbes in Food
28	Oct	Babies and HIV Infection
29	Nov	DNA Profiling and Forensic Science
30	Dec	Legal Protection of Software

topics. A list of those already produced by POST is given in *Table 3* and two examples of such work are briefly described below.

3) Finally, there are briefs that have been prepared specifically for Select Committees. To date, these have been requested for information purposes, to aid in situations where evidence to a Committee is in dispute, or to help a Select Committee decide where it might wish to turn its future attention.

Table 3 Technology Assessments

1. Technologies for Teaching, January 1991.
2. Research and the NHS, April 1991.
3. Relationships Between Defence and Civil Science and Technology, May 1991.
4. High-Performance Computing, December 1991.
5. Costing the Environmental Impacts of Electricity Generation, March 1992.

Examples of technology assessments

In this final section, examples of the issues covered in two recent technology assessments by POST will be briefly outlined[3].

The relationships between defence and civil science and technology

The rapid and far-reaching changes occurring in Eastern Europe have inevitably led to a reappraisal of defence requirements by the Western allies. In these countries, especially the UK, the USA and France, the defence industry plays an important role in the national economy. For example, in the UK, over one million people are employed in defence, and 20% of the manufacturing workforce rely directly or indirectly on defence production. Perhaps the key issue is whether military expenditure should act to support the general technology base, both military and civil. In the UK, the two sectors are kept apart, unlike, for instance, Germany, where military projects are examined for any potential civil applications that may accrue. Spin-off of military technology to civil use is not the only interaction between the two industrial sectors. In some technologies such as electronics, civil development is highly advanced and military systems can benefit from spin-in of civil R&D. Finally, there are some "dual-use" technologies that can feed both sectors, e.g., liquid crystal displays. These interactions between civil and defence work raise the question of how best to manage the relationships between the two sectors. Further, the changing international scene raises strategic issues of what future military R&D is needed, and how an industrial skill-base in defence equipment can be maintained in a period of shrinking procurement. Important contributions to this debate are the experiences of technology transfer agencies, the establishment of the Defence Research Agency, and what role institutions such as NATO, the Western European Union, and the European Community might come to play in the future.

High-performance computing

Today's supercomputers are very powerful (and expensive) machines that have traditionally been used to tackle the most complex scientific problems, from fundamental nuclear physics, through to long-range weather forecasting. But they are now being used for much more than just sophisticated "number crunching" – they are fast becoming an indispensable and cost-effective tool for all kinds of manufacturing and processing industries, from modelling North Sea oil wells to designing better cooking ware. A few years ago, the UK was as well equipped with supercomputers as any other developed nation. More recently, however, countries like Japan, Germany and the USA have been investing heavily in such machines in both public and private sectors and have outstripped the installed capability in the UK. The USA has also launched a major initiative in high-performance computing and networking in recognition of its central importance to the future wealth of the country.

A number of issues are arising for the UK. Academic research could suffer without access to state-of-the-art computing; already some academics use facilities sited abroad. The future competitiveness of British industry could also be compromised if it has neither the supercomputers themselves, nor access to graduates trained in a supercomputing culture. Many countries have sought to foster greater industrial involvement in high-performance computing by encouraging links with academic supercomputer centres. For example, in North Carolina, the supercomputing centre there can offer industrial users a complete range of computing services from simple access to the machine through to complete problem solving.

Often, users are linked to centres by 'high-speed' networks capable of transmitting tens of megabits of information per second – and this transmission speed is needed for efficient data transfer, complex graphics, etc. The Joint Academic Network (JANET) in the UK links over 100 academic institutions but industry is currently not allowed to make use of it. JANET is also too slow for some types of academic problem. Very recently, it has been agreed to uprate the network but it remains to be seen whether industry will be allowed access for profit-making activities.

Technology is also playing an increasing role in high-performance computing. Unlike present supercomputers, the next generation of machines will be based on so-called "massively parallel" architectures and will offer much cheaper supercomputers than are currently available. In parallel computing, the UK has both research expertise and a small manufacturing base. This raises the issue of how best this capability might be harnessed in the UK, for both supplier and user, what key problems face the parallel supercomputer industry, and what role the European Community might play in establishing parallel supercomputing in Europe.

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SGML concepts

Neil Bradley
Technical Development Manager
Pindar Infotek

Paper presented at the 34th Annual Conference of the Aslib Electronics Group at Danbury Park, Chelmsford, 14-16 May 1992.

Abstract

The abbreviation SGML stands for Standard Generalized Markup Language. Markup refers to adding style and formatting information to text prior to publication. It is a Standard because SGML has been accepted and published by the ISO, and is not owned by any manufacturer or software vendor. It is Generalized because SGML is powerful and flexible, allowing it to be used in many applications. And it is a Language that embodies a specification for creation of a set of rules to define the structure of a document.

SGML has been designed to easily cross incompatible computer platforms, and its "open" nature allows for relatively simple access and manipulation of an SGML conforming document by both people and computers.

Above all, SGML proposes a new way of thinking about document creation and presentation, by shifting document style considerations to the publication process rather than the creation process. This is done by dividing the document into named, logical elements, to which any style can be later applied. A by-product of this approach is the effective creation of a flexible database, providing further access to the data for information retrieval or for re-publication.

Introduction

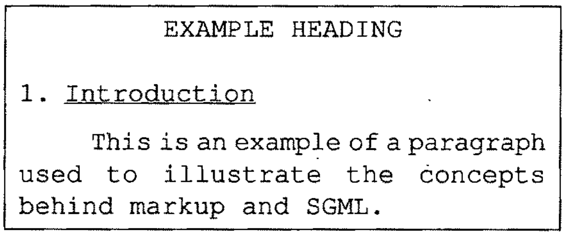
The questions 'What is SGML?' and 'Why should I use SGML?' are difficult to answer in a brief, concise manner. This is because SGML is many things. It requires a new approach to the creation of documentation, and to the publication of documentation, and promotes corporate standards and reuse of data.

Overview

The initials SGML stand for Standard Generalized Markup Language. First, we will concentrate on the prime purpose of the concept, which is to add Markup to text.

A document can be seen to contain two elements:- the information contained in the words and illustrations, and the presentation of that information. Before computers, effective presentation of text produced on a typewriter was achieved by manipulation of the typewriter during the creation of the text; for example, tabs to produce centred and indented text and overtyping with the underline character to produce underlined text, as shown in Figure 1. Publishing of a document required first, markup for style by an editor or designer, then recreation of the text by a type-setter, who could improve the presentation with styles such as italic and bold, and a variety of type styles and sizes, as shown in Figure 2. This basic procedure was used to publish this paper. However, on a larger scale, this is a very costly process. All the information required to produce a published document, both the actual text, and the presentation information, could be provided during the original creation of the document, and be available as an electronic document for publishing, which should then be a largely automatic process.

Figure 1

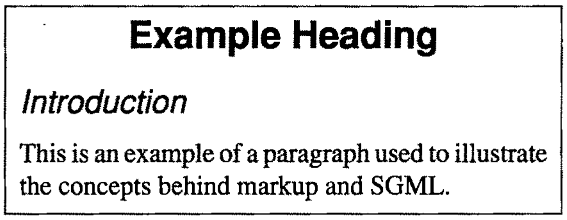


EXAMPLE HEADING

1. Introduction

This is an example of a paragraph used to illustrate the concepts behind markup and SGML.

Figure 2



Example Heading

Introduction

This is an example of a paragraph used to illustrate the concepts behind markup and SGML.

The process to avoid the re-keying of the actual text is the easy part. A document produced on a word processor is quite simply transferred electronically to a computer controlling the printing process. Adding presentation information at source is more difficult. Word processor operators have first become familiar with strange 'control codes', produced by a complex sequence of key strokes, which are visible on-screen mixed in with the text, as shown in Figure 3. Lately, this has been replaced by friendlier systems that present the text on-screen in the intended style. This is known as WYSIWYG, or 'What You See Is What You Get'. The codes are still there – they are just hidden from view. Either way, this process is adding electronic markup to the text.

Aslib Proceedings, vol. 44, no. 7/8, July/August 1992. pp. 271 – 274

Figure 3

^C Example Heading
^L 1. ^U Introduction ^N
^T This is an example of a paragraph used to illustrate the concepts behind markup and SGML.

So, what is the problem?

Firstly, the codes embedded within the text are bespoke to each vendor of wordprocessor and desktop publishing packages. There are no standards. Although this problem is partly overcome by software support for foreign data formats, allowing one specific word processor to read a computer file created by another specific word processor, it is impractical to develop such support for all packages.

Secondly, the publisher of the document may have a house style that differs from the style used to create the document, so requiring wholesale editing of the data prior to publication.

SGML overcomes these problems by providing the standard, and by separating the decision on text style from the actual creation of the text. It also provides other side benefits.

The origins of SGML

GML was developed by Dr Goldfarb for IBM in 1970. The idea was developed to become the standard, SGML, in an ANSI (American National Standards Institute) working group set-up in 1978. It was issued as an actual standard in 1986 by the International Standards Organization as *ISO 8879*, as part of a suite of standards under the heading *Information Processing – Text and Office Systems.*

TEXT format

Because SGML is concerned with the structure of text, and not the text itself, it relies on other standards to define how actual text is held on the computer system.

Although software can be written to fool you into believing computers understand letters and symbols, in their heart-of-hearts they only really understand numbers. However, a number can be made to represent a letter. For example, the number 65 can be assigned to represent the letter 'A'. Pressing this letter on the keyboard results in the value 65 being stored in computer memory, or on computer disc, and when displaying or printing the text, pattern 65 in a table of patterns is referenced to draw an 'A' shape. This is all very well, providing everyone agrees which number represents which letter. The two primary standards for this are EBCDIC and ASCII. An SGML conforming file can be produced using either of these standards, and it is a simple matter to convert a file from one format to the other, if necessary.

A file created to these standards is commonly known as a TEXT file. All popular word processors have facilities to create or read TEXT files. Indeed, the fact that SGML is based on these formats provides its first major strength, that an SGML document can be read and manipulated on any text editor, word processor or desktop publishing system, plus many other products.

Character entity references

Unfortunately, TEXT standards only provide agreed values for characters commonly found on a typewriter or computer keyboard, and not for foreign accented characters, Greek letters and mathematical symbols.

SGML overcomes this problem by using a series of standard characters – that will not become garbled on transfer to an incompatible system – to represent a single, non-standard character. For example, the French acute letter 'é' is represented by '&eacute;'. These are called entity reference codes. SGML also uses this facility to allow an abbreviated version of any commonly required text. For example, the name of the company 'Pindar Infotek' could be represented by the entity reference '&PI;', reducing the number of key strokes necessary, and ensuring consistency of representation, such as the use of capitals. On publication the original, full text is re-constituted.

SGML codes

Just like the control codes we discussed earlier, SGML codes are embedded in and around the text they affect. Such codes are identified by SGML-aware software as beginning with the symbol '<' and ending with the symbol '>'. Between these symbols lies the text identifying the purpose of the code. The code '<p>' generally indicates the start of a new paragraph. The code '<bol>' generally indicates the start of bold text. As you can see, the name of the code is an abbreviation of its purpose. There are no set rules on the extent of abbreviation, '<par>' is as valid as '<p>', and indeed, there are no strict rules on the naming of codes, and neither is there any restricted list on allowed codes. These are all optional and provide the flexibility required to make SGML useful in many circumstances.

Usually, a pair of codes surrounds the affected text. For example, a bold word will be surrounded by a start bold code and an end bold code. The ending code contains the same name, but has a preceding '/' symbol. For example, 'This is a <bol>bold</bol> word'. Of course, SGML-aware wordprocessor packages should allow a code to be produced with a single key stroke. Even standard wordprocessors usually have facilities to represent a series of characters with a single key stroke, and therefore allow SGML codes to be 'programmed' into them.

Structure not style

There is much more to SGML coding than a simple standardization of typesetting control codes. The whole concept is different.

Traditionally, coding of text has been used to indicate changes of style, say from normal to italic, or from centred text to left-justified text. This is fine providing that the format and style is definitive, and that the contents need never be logically identified. In this document, the convention for inclusion of journal names is to print in italic. We could surround such a name with italic codes, '<i>Aslib Proceedings</i>'. But we could suppose that there is a later decision to print journal names in bold instead. All such entries must be manually found and changed, as a global search/replace cannot be used without affecting other italic text. Alternatively, we could define a code for journals; '<jour>', and surround all journal references with this code, giving '<jour>Aslib Proceedings</jour>'. When printing we can remove these codes, and interpret them, to mean display in italic, or in bold, or just leave as normal. In a later re-publication, the choice can be different. We would still allow style codes to be used, but only where the author is allowed discretion to define specific styles.

Figure 4

```
<title>Example Heading</title>
<head>Introduction</head>
<p>This is an example of a paragraph used to
illustrate the concepts behind markup and SGML.
```

In Figure 4, the '<title>' codes identify the title of the document, but they do not specify a style in which to print it. Likewise for the '<head>' codes, and the paragraph code '<p>'.

The structure concept goes further; to providing database concepts such as records and fields. As an example of using structure concepts to define a document, see Fig. 5, which shows how this very document might be produced.

SGML database

There is an obvious advantage in identifying by name the elements of a document for publication. But it also provides other benefits. We could suppose that all the journal names occurring in a series of documents are to appear in an index. It is a simple matter to develop software to extract text between '<jour>...</jour>' codes from the main data files. Even if such a specific requirement is not envisaged when the documents are created, it is still a good idea to include it, as it takes little more effort than to not do so, and provides much more flexibility later when requirements may change. This is the philosophy behind SGML.

The DTD

Because SGML uses the concept of structures, it is possible to formalize the type and the use of such structures for a particular type of document, such as a book, or a memo, or a technical specification. This is where the Language part of the SGML name comes in, to provide a document type definition, or DTD.

Like the document, the DTD is, in reality, a TEXT file containing SGML codes and entity tags, so it can be just as easily transported between computer systems. In fact it may actually appear at the start of the document it applies to, but more usually, to avoid repetition, it is a separate computer file that is simply referred to in the document file.

Figure 5

```
<conference>
   <owner>Aslib</owner>
   <group>Electronic Group</group>
   <confer>UPDATE 92</confer>
   <confname>Electronics & Information
   Management For 1992</confname>
   <venue>Danbury Park Management Centre
   </venue>
   <address>Danbury, Chelmsford, Essex
   </address>
</conference>
<paper>
   <date>15/5/92</date>
   <time>14:00</time>
   <title>SGML (Standard Generalised Markup
   Language)</title>
   <note>The advantage of SGML in text data
   capture, storage, retrieval and publication will
   be discussed</note>
   <chairman>Roger Fairman, South Bank
   Polytechnic</chairman>
</paper>
<abstract>
   <absttl>...</absttl>
   <p>.....
</abstract>
<content>
   <title>SGML Concepts</title>
   ..........
   <hdr>Structure not Style</hdr>
   <p>................
   ..... see <fig>1</fig>, which shows...
</content>
```

There may be a different DTD for every type of document produced by every company in the world. However, this is not particularly useful. Transfer of documents is simplified considerably if the recipient and the sender both have access to, and use of, the same DTD. With this in mind, it is possible to publish a DTD for a common requirement, and some have been. Anyone wishing to use a DTD already published can simply copy it.

The DTD specifies what codes are allowed in the document, and in what parts of the document they can occur.

Before creating a DTD for a document type it is, of course, necessary to decide what it is required to cover. It must include every possible requirement for the relevant class of document. The act of producing a DTD formalizes the principle of applying a definitive corporate style to documentation.

Once a document is complete, a DTD Parser program may read the DTD to 'learn' the rules, then check that the document conforms to its restraints. This is a very clumsy two-stage process, so wordprocessors are now emerging which provide this function interactively, whilst the document is being created, so enforcing the rules and producing immediate prompts and feedback of errors to the author.

Real uses

The principles users of SGML to date are the large government agencies of America and Europe. The biggest and first is the CALS project, standing for Computer-aided Acquisition and Logistics Support, which is the American defence initiative to produce all technical documentation in SGML. Suppliers of equipment produce SGML-conforming electronic documentation, replacing many tons of paper.

Beyond SGML

With the ever-increasing power and capability of computer systems, people expect more diverse presentations of information; pictures, sound, film, etc. SGML is well placed to take part in this development, with facilities for including non-SGML data, such as graphics and sound, and new extensions expected to the standard, which is currently undergoing its first review since conception.

Conclusion

Despite being around for some years now, SGML is still in its infancy. As computing power becomes more accessible, manipulation, publication and distribution of large volumes of electronically stored textual information becomes ever more practical, and desirable. As this happens SGML-supporting products will rapidly appear, because SGML is the best way to serve this need.

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102H0292

Dialogue modelling for information access

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Abstract

This paper describes a dialogue modelling approach to information access. We apply this approach to the design of software used by management professionals for whom technology should be seen and not learnt. From dialogue data we identify context and mutual coverage as key dialogue features for this class of interface. We compare the handling of these features by existing systems, describe a novel query mechanism called Query By Format and conclude with the results of an evaluation study noting its strengths and weaknesses.

Introduction

To understand the interface requirements of a population of management professionals solving problems using online information we collected data from Wizard of Oz (WOZ) experiments and dialogue transcripts. The results of these studies have been reported elsewhere [WS89] [WW89]. Using person to person dialogue as a framework for understanding the interaction between software systems and their users we uncovered the dialogue features required to support these interactions. Instead of using this data to drive the customization and extension of a Natural Language (NL) system we instantiated our theory in a direct manipulation interface called *Query By Format.* We then tested it on subjects drawn from our target population. This paper describes our analysis of the data (sections 2 and 3), Query By Format (section 4), the results of an evaluation study (section 5) and our conclusions (section 6).

The dialogue data

In our WOZ experiments subjects were given information access tasks to perform using a database which they thought had a beyond-the-state-of-the-art NL system. In reality another person was reading the requests on a connected monitor, looking up the answers and typing them back. From these experiments we were able to observe people communicating free of the limitations of existing interface technology. These experiments provided a rich source of data about the dialogue features people use in person to person communication even if one person (the user) thinks the other (the wizard) is a computer. The dialogue features our subjects exploited in both sets of data were: the build up of mutual knowledge during the dialogue; and a common language.

Our transcript data covered a complete year's interactions between management professionals and a natural language interface to a large sales database. These transcripts provided data of a different kind from the WOZ data. Here we learned more about the clash between the dialogue features supported by the technology and those assumed by the user and the strategies employed to recover from the dialogue breakdown that ensued. An analysis of dialogue breakdowns showed that these were due to the lexical and syntactic differences between the capabilities of the two participants (0.09 errors per query and 0.06 respectively [WW89]).

The dialogue model

From our analysis of the dialogue data described above we have developed the following framework for characterizing the required communication channel. The resulting descriptions are at the theory level [Mar90] and as such are independent of the interface modes of the channel's implementation. The framework describes the four main aspects of the dialogues we observed: Context; Coverage; Correction and Control.

Context

Subjects made use of shared memory for the results of past interactions to refine and contrast subsequent requirements. e.g. 'Which of the Amsterdam paintings are watercolours?' (where 'the Amsterdam paintings' are the result of a previous query for the location of paintings by Van Gogh in Europe). This use of context provided short cuts to create new objects or to repeat actions previously performed. References to objects and sets of objects created during the dialogue were common amongst WOZ subjects, with 20% of utterances containing such references. This figure confirms previous results reported by Moore [Moo90]. Of these, 10% referred to previous queries, 70% referred to previous answers, 11% referred to both and 9% to either. 56% of occurrences referred to the immediately prior query-answer pair and 46% to query-answer pairs further back in the dialogue. A sample sub-dialogue is presented below for illustration:

1. Select a portrait of Van Gogh. (answer Grey Felt Hat)
2. Select 5 other pictures which have different themes from Grey Felt Hat.
3. Give the themes of all the paintings mentioned above.
4. Which cities are these paintings from – including Grey Felt Hat
5. Select two landscapes not from Amsterdam or Otterlo.
6. Where are these from?

A major difficulty for the automatic interpretation of these utterances is the ambiguity of the scoping of the anaphora. It may be clear to the reader that "these" in '6' refers to the landscapes from the answer to '5'. To derive this automatically requires some level of user modelling by the system to keep track of what the user already knows and the likelihood of the user forgetting previously imparted knowledge. A more difficult case is the referent of the expression "all the paintings mentioned above" in '3'. Does this mean: all the paintings mentioned in the dialogue; before the last topic change; or in the last utterance? In the next section we will describe our solution to this problem which was to allow users to explicitly select items from further back in the dialogue for re-use. The flexibility of such selection was one of the main observations resulting from our analysis and so is one of the main features supported by *Query By Format.*

Coverage

By Coverage we refer to the scope of the tools used for the generation of utterances. These may be lexical, syntactic, semantic, or pragmatic involving the use of referring expressions. More complex dialogues between people involve epistemic tools which rely on knowledge about the beliefs about the other participant [CL87] [GS86]. Joshi [Jos82] describes the part such beliefs play in dialogues with database query systems. For our class of dialogues epistemic tools were not in evidence.

The power of the coverage tools available depends upon the extent to which they are understood by both participants. Much of the power of SQL as a query language is lost when the other participant is not an SQL programmer, just as the expressive power of Van Gogh is lost on a colour-blind viewer. Our goal was to discover the mutual coverage required for the class of dialogues we wanted to support. Mutual coverage here is a simpler concept that 'mutual knowledge' that Clark and Marshall [CM81] describe as necessary for the recognition of intent. Their concept of mutual knowledge is more closely tied to our notion of dialogue context where the participants are building up mutual knowledge about objects mentioned. Mutual coverage therefore refers to knowledge about the communication tools available rather than the subject of communication.

A comparison of our WOZ and transcript data demonstrates the importance of broad mutual coverage. In the WOZ experiment both participants were free to exploit the expressive power of NL. In contrast, users of the NL system suffered the pitfalls of a limited mutual coverage, the extent of which the user had to discover through trial and error.

Errors in the use of the NL system mainly concerned the lexical and syntactic coverage of the system. An analysis of the lexical errors showed failure to match synonyms for database fields, values and sets of values (eg. Wholesalers). These accounted for 76% of lexical errors. Syntactic failures included interpretations of different forms of temporal expression and the typing requirements of the NL system where some values had to be prefaced by their type e.g. 'List sales for month January'.

A small rate of semantic error by the users about the functionality of the information system persisted (0.02 errors per query). Semantic errors by the system were difficult to identify as users were not available to say whether the result generated by the system was the one they had asked for.

The contrast observed between our two data sets demonstrates the importance of mutual lexical and syntactic coverage for our population of users. The resulting design principle is to make both the lexical and syntactic coverage of the system easy to learn. Neither SQL nor current NL interfaces succeed in this respect.

Correction

Correction is the repair of breakdown in dialogue caused by misconceptions held by the participants about a number of things (e.g. mutual coverage, the communication tools available, the goal of the communication). Dialogue breakdown in the WOZ experiments was mainly due to misconceptions about the contents of the database and the relations between the entities it described (eg. were 'self-portraits' a subset of 'portraits' or were they a distinct set?). On most occasions recovery was through interaction with the 'wizard' about the structure of the database. Dialogue break-down identified in the transcripts were mainly due to lexical and syntactic misconceptions and have been discussed above. To recover users either repeated the syntax and introduced synonyms or repeated the words and changed the syntax. This strategy had varying success. In many cases the recovery process ended with the user terminating the dialogue.

Some systems adopt a strategy of trying to guess the unknown words in a sentence from the known words. To check the guess, a paraphrase is generated for verification by the user. More recent transcripts from a system that adopts such a strategy suggest the problem is still unresolved. The following is an excerpt from a transcript where the user took 10 attempts to terminate the dialogue.

Q1. How many tonnes was Lite sold in 1988?
pa. How many tonnesses did Lite buy in 1988?

A1. This database contains no information about brands tonnes bought in 1988.
Q2. How many Lite delivered in 1988?
A2. I have no information about the noun "Lite".
Q3. EXIT
pa. Tell me about the ears?

(user aborts the request)

Q4. STOP
pa. What do you know about San Diego?
A4. I don't know anything about American cities.

.

.

.

Q12. exit.

(session terminated)

Successful paraphrasing has been demonstrated for checking the semantics of database queries [McK83]. Success has also been demonstrated in correcting and avoiding misconceptions implicit in user queries [May80] [Mot86] and generating cooperative responses by recognising plans implicit in queries [All83]. These successes have been domain specific and difficult to generalize. An alternative to the development of elaborate recovery strategies is to minimize the occurrence of breakdown by making the coverage of the system explicit. This is the approach we will describe in the next section.

Control

Control refers to which of the participants holds the initiative. Dialogues vary in the distribution of the initiative between the participants. In complex situations such as political discussions or negotiations a number of control cues are used to coordinate the switch of dialogue initiative from one speaker to another. An analysis of the conversational tools used to control the initiative in dialogues between people has been described elsewhere [WW90] [WS89]. These analyses focus on expert-client dialogues.

The dialogues we analysed were found to lie at one end of the control continuum where the user maintained control. The user decided the course of the dialogue and the database or wizard responded with data or error messages. At the other end of this continuum are the dialogues between users and early expert systems where the system decides the course of the dialogue and the user responds with data. The simplicity of the control structure in the dialogues we studied meant that we did not require complex conversational tools to coordinate initiative.

Query by format

We instantiated our dialogue model in a query interface called *Query By Format.* We describe below how the main components of this interface address the different features of the model, and contrast this with other query interfaces.

Coverage

To understand the mutual coverage of an interface we consider not only the theoretic expressive power of the interface language, but also how easy it is for users to map their concepts into valid utterances in the interface language. Query languages such as SQL and QBE [Zlo75] have broad expressive power, but are languages derived from relational database concepts, not users' concepts of the required information. In order to map their concepts into these languages users must understand the details of how the information is structured in the database. Users also have to know the exact lexicon of data values, and the complex syntax and semantics of query filters, joins and result formatting expressions. Later languages such as FOBE [LY81] and STBE [OO84] have extended the ideas of QBE by introducing more familiar presentation concepts like forms and tables into the query interface, but these languages still assume that users understand the internal representation of the data and a complex query syntax. Consequently for our target users the mutual coverage of such languages is very limited.

In trying to maximize the mutual coverage we have taken a user-centered approach both to the representation of the information held in the database and to the formulation of queries. This approach can be thought of as the system adopting the user's language rather than vice versa. This is a similar idea to that used in natural language processing, but here the goal is not to develop a natural language interface, but a direct manipulation one.

The information that is stored in the database is displayed to the users in the form of *domain models.* The *domain models* each represent one dimension of the information, and this is presented in terms of the concepts and structures that are meaningful to the users (eg. an organization chart or a desk calendar, see Figure 1). We arrived at the appropriate concepts, relationships and terminology for the *domain models* through the analysis of transcript data and confirmed them through interviews with the target users. These user-centered *domain models* are then used to construct reports by the selection and combination of either concepts (eg. Employee or Month) or their values (eg. Dick Tracy or March 1991). In this way users are shielded from the details of the database's internal representations, while being provided with direct access to the lexicon for their queries. We note that the *domain models* are similar to the idea of 'model views' used in MOBIAS for data browsing [BDF+91].

In order to simplify the formulation of queries over the database, we have developed a novel, essentially visual language of communication. Here, users generate utterances which embody both the query and the way in which the results are to be structured simply by constructing the format, or appearance, of the report they want to see (hence *Query By Format*). This is done by gesturally selecting elements from the *domain models* and dropping them as headings onto skeleton report structures. Once satisfied with the appearance of the report, the resulting query is submitted to the system, where it is interpreted against the database and the derived results are filled in. We have called these skeleton report structures *'information viewers'*, and there are currently three types supported:

1. *'Numeric Summaries'* which show summed totals with respect to specified headings, and which can be displayed as tables or bar-charts (eg. sales of Krunchy to selected customer references in November 1990 – see Figure 2b);
2. *'Lists'* of the values of any concept which meet given requirements (eg. the Asda customer references in territories 35 and 36 – see Figure 2a);
3. *'Information Cards'* which display miscellaneous detailed information associated with any domain value, or a description of a concept (eg. a customer's address and phone number).

These *information viewers* act as flexible frameworks for accessing information, and correspond to particular syntactic structures of the query language. Each viewer type embodies the particular kind of information that is required and an appropriate style of presentation.

Through *Query By Format* and the use of user-centered *domain models* we hoped to provide a broad mutual coverage of the lexical and syntactic tools observed in our data. We went on to test this in an evaluation study (described later).

Context

As described earlier, our analysis of user dialogues suggests that the use of contextual information from previous queries and answers is an important factor in supporting flexible extended dialogues to retrieve information. This is further borne out by research in the area of database browsing and exploration where techniques such as 'retrieval by reformulation' [Wil84] [FNL89] have demonstrated the usefulness of incremental refinement of queries based on previous queries and answers.

Systems based around traditional query languages such as SQL and QBE can provide only limited support for the use of contextual information. They allow the reformulation of previous queries, but have no mechanism, for supporting reference to answers. Such restricted re-use of context can lead to greater complexity in the formation of queries and redundancy when following up on initial information

Query By Format supports the re-use of both previous queries and answer elements to facilitate the development of a line of questioning. Old reports can be refined to create new reports by adding, replacing or expanding report headings. *For numeric summaries*, the presentation style can be switched between a numeric table and a bar chart as required. As well as allowing such *single-viewer* refinement operations, we have also provided support for the development of a query across different *viewers*. For example, the items which are the result of a *list viewer* can themselves be selected and used as headings on further *viewers*. In this way *list viewers* act as dynamic *domain models* constructed on the fly, and enable the resolution of possibly complex queries by mixing appropriate *viewers* in the dialogue. An example of this kind of use of contextual information is given in Figure 2, where some of the results of the *list viewer* have been used as headings in a follow-on query on the *numeric summary viewer*.

In addition to the immediate re-use of context, our analysis of user data suggested that users also want to maintain successful queries over longer periods and across sessions. Such longer term management of context is provided by facilities for the saving and copying of *information viewers*. *Viewers* may be saved and restored individually or as a complete set, and hence may be re-used across sessions. As well as supporting user-initiated copying, the system automatically produces a copy of a *viewer* whenever one with results displayed is further edited (thus retaining a trail of intermediate results). In this way significant points in the dialogue are retained and can be returned to later.

Correction

To address the issues of correction we have attempted to minimize dialogue breakdown rather than adopt elaborate recovery tools. Breakdown is avoided by: making the lexical and relational coverage of the system explicit in the *domain models*; representing these in user terms; and restricting the way in which these labels can be used to form headings on *information viewers* in order to ensure that queries are syntactically correct. These, along with context-sensitive menus and an undo facility, are standard Direct Manipulation techniques which matched the requirements derived from our data.

Control

As described earlier, the control aspect of interfaces for database query is straightforward, with users maintaining control. Hence, in common with current database query interfaces, users of the *Query By Format* interface are left in control to formulate their own queries. When required, queries are handed off to the system for evaluation over the database and results are returned. The system takes control only when data is exported to other software applications in which case a dialogue box is generated for clarification regarding the destination. Other exceptions are system crashes, when the dialogue is terminated regardless of the user's wishes.

Evaluation

The strengths and weaknesses of our dialogue model and its instantiation in *Query By Format* were examined through an evaluation study of a prototype interface. This interface was to a large sales database which included information on: product families and their packaging; customers organizations down to individual supermarkets; sales regions including territories and local television areas; a financial reporting calendar down to individual reporting book-weeks; and historic sales information in terms of sterling, cases or tonnes sold.

We looked at the performance, behaviour and comments of 8 pairs of users from our target class of business professionals. We asked pairs of users to work together in order to generate explanatory dialogues. These users were computer literate, but were naive to the system and also unfamiliar with the chosen domain. Users were given a total of only 20 minutes training on the system including explanation of the domain. They then attempted to answer 14 questions, examples of which are given below. The average time taken to complete these tasks ranged from under 1 minute to about 5 minutes.

1. What information is available on the Krunchy 250g Consumer Unit?
2. What was the turnover in pounds Sterling over the last 8 weeks of 1990?
3. List the Product Codes of all the products we sold to the Tesco Trading Concern in November 1990.
4. Of the Corporate Concerns Argyll plc and Asda plc, who is our biggest customer for the Krunchy Brand?
5. How many Cases of the Lite Brand did we sell to the J Sainsbury Trading Concern in October 1990?
6. How much money did we take for sales of the Lite Brand to the J Sainsbury Trading Concern during the middle three weeks in October 1990 (from the week ending 13th October to the week ending 27th October)?

Note that the combination of users' unfamiliarity with the domain and the limited amount of training given in a single session meant that this was a stringent test of the system. In practice users would be domain experts and the system would probably be used regularly by experienced users. By testing the system under these conditions we hoped to test the limits of its usefulness and expose as many of its limitations as possible.

The results of the evaluation showed that users were able to successfully complete 75% of the questions attempted. This indicates that the mutual coverage was indeed effective for these novice users, although some breakdowns in the dialogue did occur. Furthermore, a qualitative analysis of videos suggests that the use of contextual information was significant in supporting the asking of follow-on questions: in the majority of cases users first read the question to be answered, then considered the relevance of existing query results; if an existing result was similar to the question to be answered then they edited it (eg. answering question "6" using question "5"), otherwise they got a new template and started to compose from scratch.

Where breakdowns did occur in the dialogue, we can categorize them in terms of some surface implementation details and then some more serious problems. Examples of problems with surface details were: some difficulties in selecting and deselecting objects on the *domain models* (due to inconsistencies in style of action and feedback across the different *models*); and problems in using the options on an "Edit" menu to perform the required labelling of *information viewers* (due to poor naming and limited functionality of the options, and a lack of support for more direct means to arrange and manipulate the labels).

The first of the more serious problems was that not all users understood the limitations in the ways in which different kinds of labels could be used to label *information viewers*. For example, in the current system *list viewers* can only have concepts (such as Brands) as column heading and values (such as Krunchy) as constraints placed on the rows. Some users tried to put the wrong kind of label in the wrong position, indicating that they either did not appreciate the difference between the type of the item to be listed and the constraints to be applied to the listing, or that they did not realise that these things had to be placed at particular locations on the list framework. This problem could be alleviated by either using stronger visual cues as to which kind of label is appropriate in which position (we had used colour), or by relaxing the syntactic constraints on the *viewers* to allow a more flexible arrangement of labels.

A second problem was misunderstanding of the defaults associated with the *information viewers*. For example, question number "2" can be answered by simply adding a time constraint to a *numeric summary viewer* together with the appropriate sales metric and then evaluating the query (the default interpretation giving sales over all products and customers). However some users tried to explicitly add "All products" and "All customers" using the top level concepts from the respective *domain models*. This problem could be lessened by having explicit labelling on *viewers*.

The third of the more serious problems was indicated by the fact that some tasks were completed with an incorrect arrangement of headings (ie. with labels being wrongly grouped to constrain the values appearing in a cell). This could be due to either the difficulties in editing headings (mentioned above), or to a problem in understanding the general semantics of table headings. The latter possibility has serious consequences for query languages relying on the semantics of tables to facilitate ease of use. A more detailed analysis of these results is given in [Fro91].

Conclusions

Taking a dialogue modelling approach, more typically used for the customization and extension of NL systems, we were able to identify the dialogue features required to support information access by management professionals. Such information about the process of communication is usually missed by conventional requirements analysis which concentrates on the data to be provided. Mutual coverage and the use of dialogue context were identified as key communication features. The resulting dialogue model was used to develop a direct manipulation interface called *Query By Format* demonstrating the mode independence of the model.

A prototype *Query By Format* interface to a large sales database was successfully used by domain-naive users. This result demonstrates the utility of a dialogue modelling approach and the effectiveness of *Query By Format*. The weaknesses identified in the prototype confirmed the importance of mutual syntactic coverage and cast doubt on the assumption that the semantics of tables is commonly understood.

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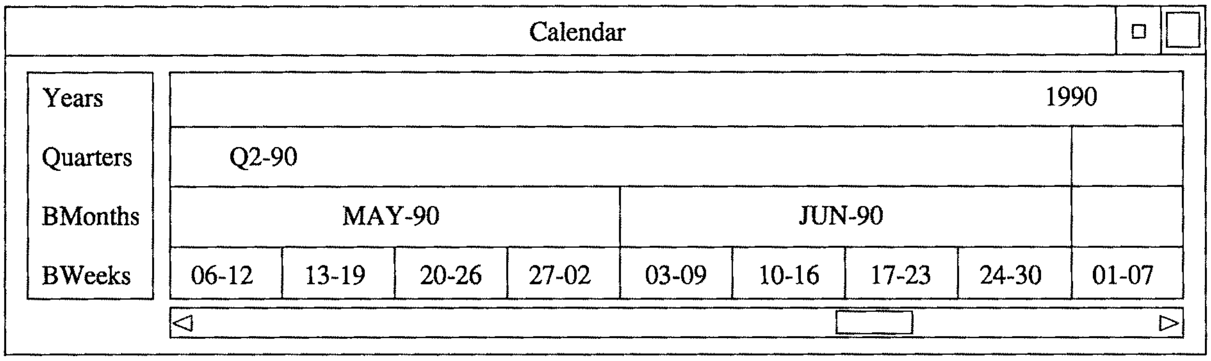
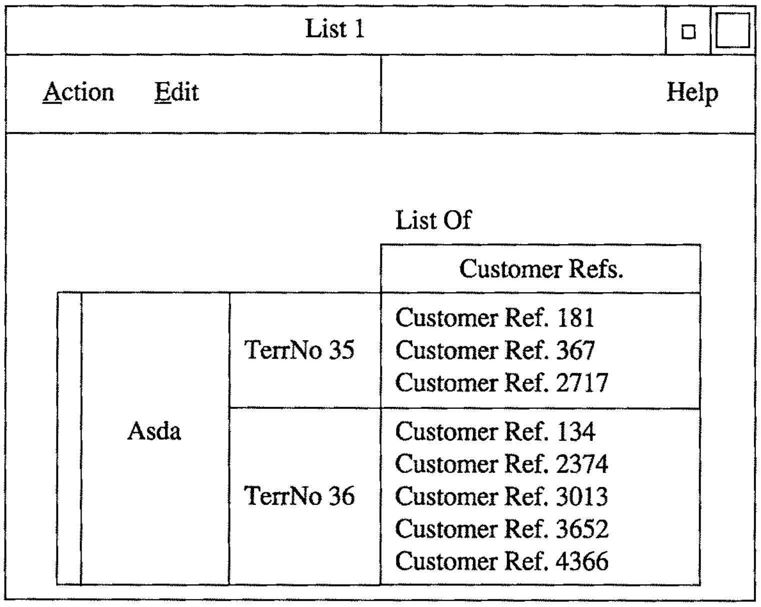
Figure 1: Example Domain Model



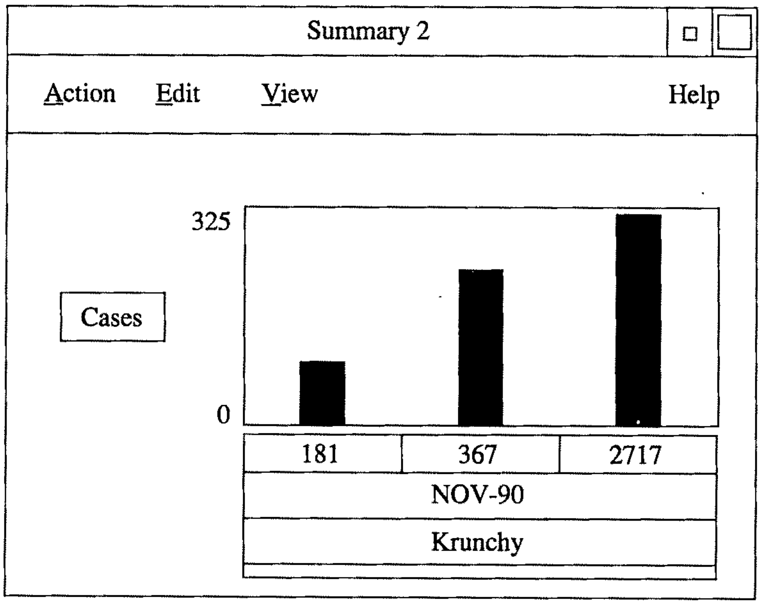
Years	1990								
Quarters	Q2-90								
BMonths	MAY-90				JUN-90				
BWeeks	06-12	13-19	20-26	27-02	03-09	10-16	17-23	24-30	01-07

Figure 2a: Example List Viewer



		Customer Refs.
Asda	TerrNo 35	Customer Ref. 181 Customer Ref. 367 Customer Ref. 2717
	TerrNo 36	Customer Ref. 134 Customer Ref. 2374 Customer Ref. 3013 Customer Ref. 3652 Customer Ref. 4366

Figure 2b: Example Numeric Summary Viewer



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Just another management fad? The implications of TQM for library and information services

John R Brockman
Librarian, Ministry of Defence Libraries (Bromley)

Paper presented to the 34th Annual Conference of the Electronics Group, Danbury Park Management Centre, Chelmsford, 14-16 May 1992.

Abstract

The quality issue represents one of the greatest challenges facing managers in the 1990s. This paper presents an overview of the development of quality management in library and information services (LIS) on the basis of its evolution from quality control, through quality assurance (QA), to total quality management (TQM). This development is exemplified by case studies of UK and North American LIS which have been required to comply with quality strategies of their parent organizations, and those which have adopted unilateral strategies.

The literature of quality management seems rife with confusion over terminology. Some of this appears to have been the result of the so-called "quality gurus" asserting the novelty of their individual philosophies of quality. Each is followed by a band of disciples and devotees (consultants and other practitioners) who are equally keen to promote their own particular approaches to quality management and sometimes add to the terminological morass. As well as the conventional terms defined below, we also find Total Quality Control, Total Quality Assurance, Quality Assurance and Service Reliability, Company Wide Quality Control, Marketing Quality Assurance, Quality Service, Service Quality and so on.

For present purposes the standard BSI/ISO definitions will be adopted for the three most common, and most frequently confused, concepts[1]. These are as follows:

Quality control: The operational techniques and activities that are used to fulfil requirements for quality. Quality control... aims both at monitoring a process and at eliminating causes of unsatisfactory performance at relevant stages of the quality loop in order to result in economic effectiveness.

Quality assurance (QA): All those planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirements for quality.

Total quality management (TQM): A management philosophy embracing all activities through which the needs of the customer and the community, and the objectives of the organization are satisfied in the most efficient and cost effective way by maximizing the potential of all employees in a continuing drive for improvement.

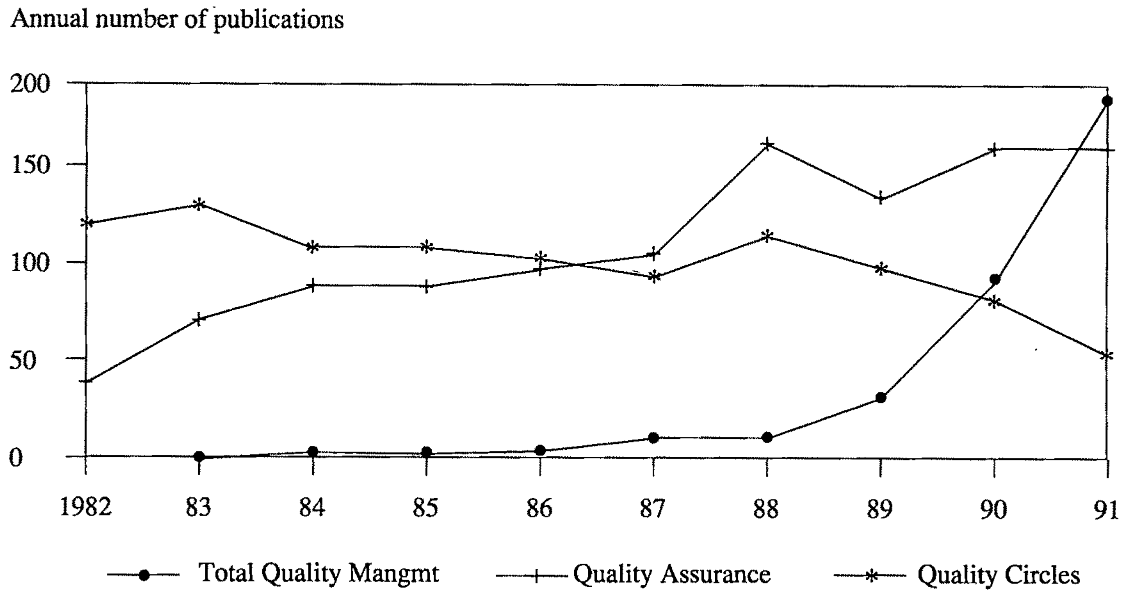
It should be noted that TQM embodies the first two, together with all other management activities. Burgess[2], sees them as the final phases in the evolution of quality management, in which the steps are:

- craftsmanship
- the Industrial Revolution
- mass production
- inspection
- quality control
- quality assurance
- total quality management

An analysis of the management literature of the last ten years provides an insight into the growth of interest in TQM, and is perhaps indicative of its rate of take-up (see Figure 1). The fact that the exponential growth of the TQM literature begins in about 1988, the point at which the growth of the QA literature tends to flatten out, suggests that this could be the cross-over point in the evolution of QA into TQM. For the sake of clarity the progress of the quality control literature has been omitted. As a much older technique its use is more widespread and yields about 800 publications a year, and is still slowly rising. This graph also charts the decline of the somewhat disparaged quality circles approach to quality management, of which more will be said later.

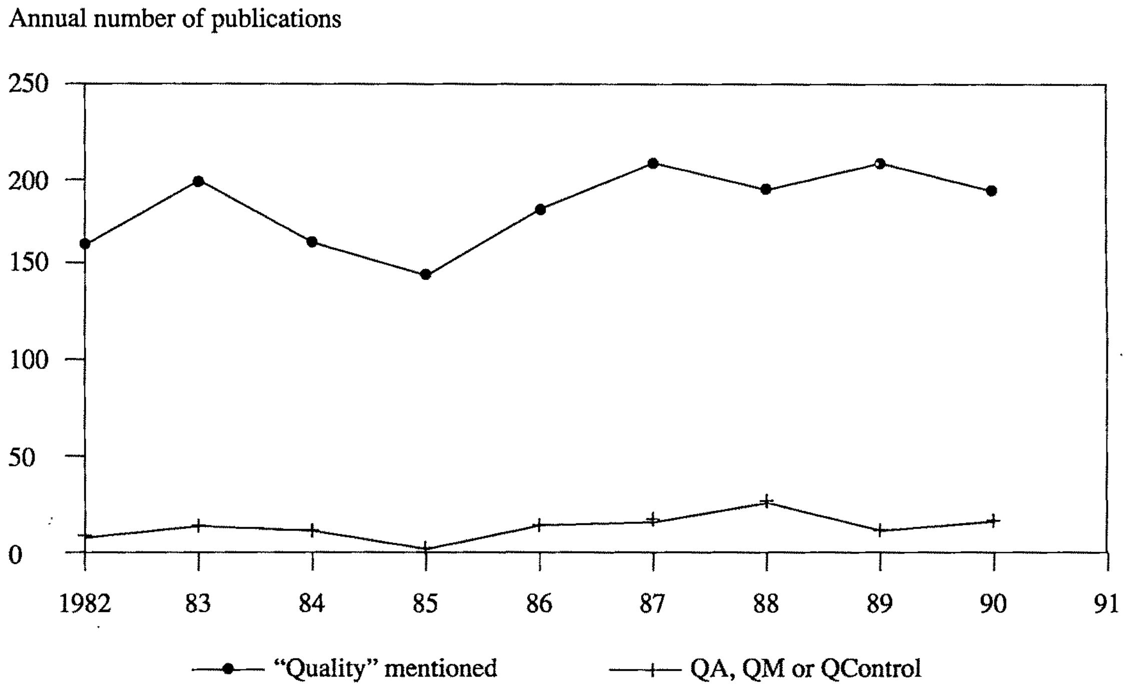
By comparison, the literature of library and information science up to 1990 suggests that practitioners in this area were still not taking the quality management revolution very seriously (see Figure 2). Unfortunately the 1991 input has been very slow to get into the two databases used as the source for this analysis.

As organizations have progressed towards TQM the most important changes involve the roles of management and measurement. In the case of the former, the responsibility for quality ceases to be delegated to QA staff and becomes the concern of all employees, but especially top management. The emphasis of measurement systems also changes from being internally to externally orientated and more customer-focused. In the TQM environment an increasingly important measurement technique is benchmarking, which has been defined as:



Source: ABI/INFORM database

Figure 1 – The management literature.



Source: LISA and Inf. ScI. Abs. database

Figure 2 – The library and information science literature.

... the continuous process of measuring products, services, and practices against the toughest competitors, or those companies recognized as industry leaders.[3]

Many library managers are quite accustomed to making comparisons using the various library statistical compilations. Inter-library comparison has tended, however, to concentrate on mean values of performance indicators, rather than identifying the leading performers as a spur to achieving excellence.

Quality control

In view of the above developmental sequence it seems significant that one of the earliest general discussions of the management of quality in library and information services (LIS) dealt with this matter at the quality control level. In 1988 O'Neill and Vizine-Goetz of the Online Computer Library Center (OCLC) described methods of quality control in the online information industry, and traced this activity back to the 1960s when work started on the development of the theory and methods of automatically detecting and correcting spelling errors and applying self-checking numbers to machine-readable data[4]. These authors also review the methods of authority control to ensure consistency in the form of headings used in bibliographical records, and correcting or supplying punctuation and capitalization, as well as detecting duplicate records.

A recent survey of the online industry seems to suggest that some hosts, and many producers, are still focusing primarily on quality control, with its emphasis on checking, inspection and proof-reading, rather than on the broader more externally-oriented process of quality management[5]. There are exceptions, and Dialog Information Service, Inc., sees customer feedback as essential in "closing the loop in the quality assurance circle"[6]. It has been largely through the recent efforts of the Library Association and the UK Online User Group that representatives of the online industry and users have now come together to discuss the broader aspects of quality of these services[7].

Quality assurance

One of the most significant phrases in the above BSI/ ISO definition of QA is "given requirements", for this implies the provision of goods and services in accordance with a *published standard* recognized and accepted by both the producer and customer.

If we move up to the quality assurance level we therefore find that those LIS involved fall into two broad categories:

- Services whose parent organizations have obtained certification under the British Standards Institution standard on quality assurance, BS5750/ISO 9000.
- Services which have initiated their own approach to QA, and perhaps may even seek quality certification on their own account.

There are probably more LIS in the first category than the literature would suggest, but one of the few published accounts of the processes involved is that of the Senior Librarian of the Building Design Partnership (BDP)[8]. The parent company recognized the business advantages to be gained by achieving national and international recognition within the design profession as a firm of assessed quality. Most importantly, BDP would receive an entry in the DTI's published register of quality-assessed organizations. As with all such cases, BDP was required to demonstrate to the BS5750 auditors that it had established and maintained procedures to control all documents (standards, specifications and manuals) relating to the requirements of the QA standard. This led to a raising of the level of recognition of BDP's Information Centres, accompanied by an increase in their funding and launching of additional services. The company acknowledged that certification could not have been achieved without being able to produce evidence of adequate information services.

Turning to the second group, one of the most notable examples are the Canadian medical libraries, which must be regarded as the pioneers of LIS QA. As early as 1967 medical staff library services became a prerequisite under the Canadian Council on Health Facilities Accreditation Scheme[9]. Since then medical library standards have been extended and refined and they now take into account: library goals and objectives; organization and administration; direction and staffing; facilities, equipment and supplies; policies and procedures; information resources and services; education; and QA systems. Qualitative guidelines were also produced for each of these eight sets of descriptive standards, which in 1989 were being revised in order to emphasize outcome measures and risk management.

An interesting UK case involves the Taywood Information Service, part of the Taylor Woodrow group, which successfully applied for certification under BS5750, the first LIS to do so on its own account[10]. Like the BDP Information Centres, Taywood Information Service was already involved with a succession of quality audits conducted in connection with the certification of the various Taylor Woodrow companies forming its customer base.

Taywood Information Service saw certification not only as a means of reducing the number of audits, but also considered that a fully-fledged quality system would form a useful management tool. Most importantly of all, its registration sent a vital message to senior management that it was doing a top-rate job, important when money was short.

One consideration when planning possible quality strategies concerns the choice between certification under BS5750, and aiming at full-scale TQM. The difference is largely one of scope, and the choice depends on whether management feels that quality can best be improved by installing quality systems, or whether a cultural change is called for. This question has been addressed by several general writers on TQM, and at least one information science academic[11].

Total Quality Management

As explained above, TQM incorporates QA as one of its elements, but even the experts disagree on whether an organization should seek BS5750 QA certification before embarking on TQM, or vice versa.

When considering this relationship between QA and TQM it is instructive to examine the experience of the Information Services of ICI Chemicals and Polymers Ltd.[12] This company, in partnership with a number of others in the ICI Group, saw TQM as a means of achieving a very necessary cultural shift which would lead to a new form of supplier/customer relationship in which internal as well as external customers would be recognized.

Following initial TQM training, the main thrust changed to QA; TQM determined the requirements and QA assured that they were met. The company's Information Services now has its own QA manager in order to satisfy the conditions of BS5750, and has found that as well as clear benefits to its customers, major cost savings are achievable from the closer definition of requirements.

As in the case of QA, LIS which have embarked on TQM fall into two main groups: those whose parent organizations are adopting TQM and the LIS are therefore required to follow general policy, as in the case of ICI, and those which are doing so unilaterally on their own initiative.

When examining those in the first category it is particularly appropriate to look at the case of the corporate library serving Florida Power & Light (FPL), a public utility providing electricity to about half the state of Florida. FPL is notable for being the first, and so far only, non-Japanese company to win the world's most coveted and prestigious quality award, the Deming Prize of Japan. The latter was named in honour of Dr Edwards Deming, the American quality expert who in Japan is regarded as a national hero for his contribution to Japan's post-war reconstruction.

One of the many published accounts of FPL's success story describes two of the library-related implications of this achievement, and particularly the team approach to the identification of quality problems and their elimination[13]. One of the library teams established improved procedures for processing requests for items not in stock. This was not a complex problem, but it helped library staff to learn the process, from problem identification, to preventing the problem and its root causes from recurring, to final evaluation of the team's effectiveness. The second problem area involved the provision of library and information services to remote locations of the FPL system using a cross-functional team approach to address the various logistical problems, with members drawn from both library staff and customers. Publicizing quality achievements is important in TQM, and in FPL this was done by means of team "storyboards" displayed in hallways illustrating the problem-solving process undertaken by each team. (The names adopted by the two library teams sound whimsical to British ears: The Clippers and The Happy Bookers!)

It is interesting, and perhaps significant, that those LIS which have been actively involved in their parent organization's TQM strategy appear to have become very integrated into the functioning of the organization. In the case of the Weyerhauser Company, a leading US wood-products manufacturer, the LIS became responsible for the corporate Center for Quality Resources, a vital component of the company's drive for quality[14]. This recognition was aided by a benchmarking survey, of the type described above, in collaboration with similar LIS.

The second category of LIS under this heading, those which have adopted TQM on their own account, inevitably contains large monolithic services, such as the US Defense Technical Information Center (DTIC) and the National Technical Information Service (NTIS).

DTIC is the central point within the Department of Defense (DoD) for acquiring, storing, retrieving and disseminating scientific and technical information to support the management and conduct of DoD R&D programmes. It has a staff of just under 400. DTIC's mission statement includes the pursuit of a programme for applying advanced techniques and technologies for developing improvements in services and in information transfer effectiveness. The formal adoption of TQM within DTIC is a relatively recent development, but this objective occupies second place in the organization's eight-point vision statement for the year 2000.

One of the first components of DTIC's quality strategy, pre-dating TQM by several years, was the staff suggestions scheme. Suggestions are known locally as Model Installation Proposals (MIPs). These have been the source of many good ideas, and rewards range from on-the-spot cash awards of up to $250, to a 'pat on the back'. The MIP scheme is open to DTIC's users (including DoD contractors) as well as its own staff, but the former are not eligible for cash awards. During the author's recent visit the DTIC Administrator mentioned that the number of suggestions is declining, but so much has been accomplished through the scheme that he considered that such a fall-off is inevitable.

The second step in the evolution of the strategy was the introduction of quality circles (QCs), in which about one quarter of the staff currently participate. The composition of QCs cuts across organizational divisions and hierarchies, and their number fluctuates as quality-related problems arise, and then are solved. There is also a QC of QC leaders, forming an inner circle, and once a year DTIC holds a QC Recognition Day. The proportion of staff involved in QCs has recently declined, but once again the Administrator did not regard this as significant, and thought it could even be regarded as an encouraging sign.

In 1989, after working with the MIP scheme and QCs, DTIC's quality strategy evolved into comprehensive TQM, managed by a full-time TQM Coordinator. Its implementation embraces the principles and supports the goals of the TQM Master Plan of the Defense Logistics Agency, DTIC's parent body, and its development is the responsibility of a TQM Executive Steering Committee chaired by the Deputy Administrator. An annual one-week user conference is an important feature of DTIC's quality strategy.

Like DTIC, the TQM strategy of NTIS, a similarly-sized body, evolved from the use of QCs coupled with a well-established staff suggestions scheme. NTIS TQM is controlled by a full-time manager and a full-time QC facilitator, while policy is formulated by a Quality Management Council chaired by the Head of NTIS. QCs, which currently number nine, are employee-operated and comprise five to ten members, usually meeting once a week. Each circle contains a trade union representative. During these sessions problems are brainstormed and data collected, and if necessary the circle can call for supporting research and other resources to help with solutions. Currently about 80% of QC proposals are accepted by NTIS management. With the advent of TQM in NTIS the emphasis of group problem-solving shifted to wider areas of concern than those of the QCs, and newly formed groups represented both employees and management. TQM implementation included an employee survey of attitudes to quality, and questionnaire surveys of customers are regularly undertaken.

In 1987 NTIS received the US Senate Productivity Award for Virginia for its innovative use of automation, QCs, improved communication, professional development and integrated planning systems to improve productivity.

Conclusion

Returning to the question posed in the title of this paper, is TQM another management fad? Currently there is no evidence to suggest any fall-off in its application, in spite of its very high failure rate. One authority estimates this to be as high as 80 per cent of all TQM programmes[15], and even Florida Power & Light is now revamping its quality programme in favour of an approach which places more emphasis on communication[16]. One complaint is that private sector TQM has frequently been slow in producing bottom-line results, and that its emphasis on processes has sometimes produced excessive bureaucracies.

There have also been misconceptions on the part of many managements about the scope for TQM. The word "total" refers of course to "management", and not to "quality". This gives rise to assumption that TQM can only be implemented across an entire organization, and not to an individual part or parts, such as an LIS. This is not the case, and as the quality guru Philip Crosby claims, a unit within an organization *can* implement TQM on its own, and if effective, others will want to know the remedy for its success. He calls such initiators 'quality heros'[17].

Furthermore, one of the four new Civil Service College courses on TQM focuses on its introduction into a small organization or section[18], and figures as low as 50 employees have been quoted as indicative of the smallest firm which could possibly benefit from introduction of TQM[19].

Several UK associations for information professionals have recently held courses and seminars on QA. There now appears to be a need to make LIS managers aware of how their services can benefit from operating in the broader TQM environment, and how they can best respond to the implementation of TQM by their parent organizations. This potential has now been recognized by the US Special Libraries Association and Council on Library Resources, who are sponsoring a travelling continuing education course on TQM for librarians[20].

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Promoting the in-house library

Grace McCarthy
BICC Cables Limited

Paper presented at the 34th Annual Conference of the Aslib Electronics Group at Danbury Park, Chelmsford, 14-16 May 1992.

Abstract

This paper discusses the importance of marketing in an in-house library and focuses in particular on the importance of continuing promotion. The paper suggests forms of promotion which may be appropriate. There are also suggestions for saving on the costs of promotion and on dealing with the problems caused by increased usage of the library/information service as a result of a successful promotion.

Introduction

Marketing is still a dirty word to many people, synonymous either with the person with a clipboard on the High Street, whom you desperately try to avoid in case you happen to be in one of the categories he/she still needs to complete, or with selling – selling encyclopaedias, double glazing, time share ... where it seems that people will do anything to sell you what they've got, whether you want it or not.

In fact, the definition of marketing by the Chartered Institute of Marketing is very much closer to the noble aspirations of our own profession. It is:

> Marketing is the management process responsible for identifying, anticipating and satisfying customer requirements profitably!

The last word needn't be a stumbling block – non-profit organizations can just leave it out. But the rest – 'a management process' – yes, that's what we do, isn't it? 'Identifying anticipating and satisfying customer requirements'. Isn't that what customer profiling and proactive librarianship is all about? We wouldn't survive unless we were able to satisfy customer requirements – not in the present climate anyway. We anticipate customer needs by predicting the books they will want to read, the current awareness services they will use and so on. 'To ensure long-term viability, the best marketing always begins with providing excellent service to your clientele', to quote Marydee Ojala in Dialog's *Adventures in Marketing*. (OJALA, 1989)

So we are already marketing our library information services, but in the past, we have been loath to say so.

Once you accept that we are in the marketing business it follows that, as professional managers, we should approach the marketing business professionally. I have given a number of references at the end of the paper to papers which refer specifically to marketing in the library context. There are also a number of courses such as those run by Aslib.

The marketing mix

Marketers refer to the marketing mix as the way in which they satisfy customer requirements. It is often called the four P's:

Product
Price
Place
Promotion

These are four variables you can change in order to alter the demand for your product. A product in this sense can be a service such as a current awareness service or a reference enquiry service. Your range of products needs to be reviewed regularly; I would suggest annually. Are all your services being used? Is the benefit from each service more than the effort/time/money you have spent on producing it? What do your users think of it? It is a really good idea to ask your users rather than just guess at their ideas.

For instance, I compile a bulletin of new materials and processes relevant to our industry. Very few people actually get back to me for further information. This contrasts with our general current awareness service where the requests come flooding in. So, with the vague thought in the back of my mind, that perhaps if no-one was using it, I could discontinue it, I put out a 'renewal card', incorporating the requirement to return it if the reader wanted to continue receiving the bulletin. The response was overwhelming. One has discontinued because his subordinate is receiving it and there were three name changes, but everyone else still wants it. They find it easy to use. They feel reassured that they are keeping up to date if there's nothing new. If there is something new, they have brief details in the bulletin from which they decide whether or not to contact the manufacturer. I now know a lot more about how people use the bulletin and the sort of information they want from it.

The price is an issue over which you may or may not have control. You may be treated as a cost centre or you may be attempting to generate revenue. Charges may be imposed on a time basis or may be allocated to various departments according to usage. If you do have control over charging, it may be worth experimenting to see how changes in price affect usage and perception of your services.

Place, as in physical location, is also fixed – for most of us. But 'place' also incorporates all the distribution channels – E-mail, fax, post etc – the way you get your information to the person who wants it. If you make using your services as easy as possible for the user, by taking requests by telephone, fax, modem, and on scraps of paper rather than on neat printed forms, they you can counteract the inverse relationship observed by Mason (MASON, 1978) and others 'between the use actually made of a service and the distance that has to be travelled to use it'.

Price and place may be things which you can only influence but not actually determine, whereas product and promotion are under your direct control. The focus of this paper will be on promotion, but we should always remember that this is only one aspect of marketing, and for example, putting a pretty cover on an irrelevant, inaccurate, out-of-date piece of information will do no good at all.

Promotion

First of all, why promotion? Because you need to tell your users and potential users what you do and what you can do. You also need to let those who make decisions which affect the library, know about all the wonderful things you do. Some people think this is dangerous – stick your head above the parapet and someone might shoot you, whereas if you stay nice and quiet in the background, maybe they'll let you alone... but someday someone will notice and will decide that no-one would miss the library if we cut it and that would save a nice neat £XYZ. 'Publish or perish' may be the academic cry, 'Promote or perish' could be ours. There is little point in providing an excellent service if very few people use it.

Our general purpose in promotion is to create and maintain awareness of our services. You may also have specific objectives such as to launch a new service eg CD-ROMs, to reach a new group of users, to increase the number of users in a particular area. You should set these objectives in such a way that they can be assessed – an important part of any campaign is to see whether you have succeeded. If you can identify why some campaigns succeed better than others, you will be able to improve your future campaigns. And of course, there will be future campaigns, we are not talking about a once-off promotion. We must continue to keep up awareness and convert awareness into active use of the Library.

Before contemplating a promotion, you need to be quite sure about what you are promoting and to whom – the way you promote a service must be appropriate to the people whom you are trying to attract. Do you want to promote the library as a whole or just one particular service? What are the strengths and weaknesses of your services? What opportunities are there to expand? What threats are there? Who is the competition? A SWOT analysis of each service and of the library as a whole will help you to determine the areas in which you are strongest and on which you should build. These are the areas where you might like to start your marketing endeavours, to gain confidence. It will also identify weaknesses to which you must face up rather than ignore.

Having done your SWOT analysis, you not only need to send your users a list of all the strong points, you need to think of each of these in terms of the user's needs. In other words, instead of selling features, sell benefits. The fact that you have access to thousands of databases may be impressive, but many of those databases will be on completely irrelevant topics. What will really impress the user is if you can find him/her relevant information in a short space of time. For this reason also, many very competent librarians manage to bore their audiences completely by reciting a catalogue of all the types of information available.

I recently sat through a talk by a librarian who gave a thorough presentation of all the places people should look for information on their chosen topics. She went through the books, periodicals, grey literature and so on very thoroughly and competently. However, most library users don't care where the information is, or what physical form it comes in. They prefer examples showing the relevance of the available information to their interests. That is why it is much easier to give individual or small group presentations than to address a mixed bunch.

An active presentation using a computer search on a topic of genuine interest to the person is far more likely to make the person a regular library user than a recital about *Books in Print* or HMSO publications. Some people feel more confident demonstrating a search they know will work. However, a live search will give the user a more realistic idea of what is involved in generating keywords, in narrowing/broadening searches, and of the sort of problems that can crop up, than using a 'safe' topic. If we only show a search that generates exactly the right results first time, the user will build up expectations which will be difficult to live up to.

There are four means by which you can promote your services: yourself, the library, the packaging of the products you offer and promotional activities.

YOU Your manner whether in person or on the telephone, will affect your users' rating of the library. You need to be professional and use quality procedures but you also need to smile and establish a personal relationship with as many of your users as possible. In an in-house setting, you can build up long-term relationships with people but even where large numbers of people come in, once they have produced their reader ticket with their name on it, you should address them by their name. It does make a difference.

There are some very good librarians who do an excellent job of finding information but when you ring them up, they sigh and say 'Oh dear' and make it sound extremely unlikely that they will be able to do anything for you. Smiling on the telephone changes the tone of your voice and makes you sound more friendly and human.

Your manner will also determine customer's actions after they have complained about something. 'A well-handled problem usually generates more loyalty than you had before the negative incident', according to a TARP survey. Furthermore, if you react positively to complaints, people will be encouraged to tell you about other things they would like changed, whereas normally people are reluctant to complain. Indeed, in the in-house setting, they are even more reluctant to complain than the general public, because they know you and they don't want to hurt your feelings. The next time someone makes a criticism or complaint or asks 'Why don't you ...?', instead of automatically explaining why not and defending your position, think about their suggestion. It may not tally with traditional librarianship or information science, but then traditional librarianship or information science was designed around public and academic libraries, not industrial ones. Original ideas will often come from people with different backgrounds, not from fellow professionals in similar setups.

The Library should be clean, tidy, signposted, welcoming, and easy to use or contact, as mentioned earlier. The % of people who will actually steal from an in-house library is very small so we should not make the rules to cope with them but to suit the majority. This may mean leaving the library open after hours so that people on shift work can come in to borrow a book, for example.

The products or services should all be tailored to the user's requirements and where possible letters should be personally addressed (easy using a mailmerge facility on any wordprocessor). The output of computer searches should be tidied up, any gobbledegook removed, and reformatted for ease of use. There are a number of reformatting programmes available now which make this process very fast. You may like to use covers with your searches – Dialog provide some which you can customize with your own Library's name. Every communication which leaves the Library should be an advertisement for your service. A laser printed copy on plain paper looks far more professional than a dot matrix printer copy with faded print.

I got an "invoice" from a library not so long ago on a torn off piece of paper from a dot matrix printer. There was no address on it, no official stationery was used, not even an accompanying compliments slip. The accounts department had difficulty in believing it was genuine. The reason turned out to be that if the library went through the Bursar's to raise an invoice, they had a long delay in getting paid whereas if they raised their own "unofficial" invoice, they got the money faster. That doesn't explain why they couldn't use proper headed notepaper though.

FORMAT	CONTENT
Brochure/Induction/ Open Day/Presentation	What the Library can do for you (Features!)
Direct Mail	New subject area/new technology
Demonstration	User Training
Notice Board	Attract people's attention
Visit to or from users	New Service
Bulletin/newsletter	Current Awareness/ Success Stories
Telephone Directory	Listing under your name and as Library/Information Service
Suggestion Box	Find out what they would like
Logo/Slogan	Help them remember you
Questionnaire	Mentioning other services available

Promotional activities can take many forms, so for convenience, I've listed them in a table and will discuss some of them in a bit more detail.

Brochures vary from the professionally produced glossy to the type-written hand-out. If you have access to a DTP system and the time and the talent to produce something professional, good for you. But don't underestimate the time involved. You may be able to share a brochure for the unit in which you work. That way you get the glossy brochure for free. It is important to keep your brochure up to date, especially if you have given sample prices or used photographs of staff – there are some wonderful 60s style hairdos trying to sell 90s style information.

Logos and slogans are useful ways of helping people remember you. Whether you design an artistic logo or a simple functional one will probably depend on your talent or the talent to which you have access. Slogans vary also. I have to live with a slogan someone else invented as a first step for all our R&D projects "Say Grace" ... Well, even if it is corny, it does help people remember my name and that they should do a search before starting new work.

Personal visits are a form of promotion, akin to personal selling except that you must listen as well as talk to the person who visits you or whom you visit. You can provide a marvellous service to the same people year in year out and think you are doing a really good job – but what about the people who don't use you? Are they getting their information elsewhere – in which case, could they pass it on to you as well? Are they doing without? Have you ever gone along to someone and said 'Why don't you use the Library?' It can be as simple as getting a department head to say he/

she wants people to use the library. Sometimes people need that encouragement, or they think they will be seen as dodging work if they stop to look up the answer in a book rather than just go straight to the lab and work out the answer again.

Having the library included in visits by other companies, whether competitors, suppliers or customers, is good PR for the library. It makes your own colleagues realise that the library is a valuable asset and that you can perhaps do more than they thought. Coverage of your activities in in-house magazines is also invaluable.

Promotion is all a matter of reminding people that you are there and what you can do. Once they are aware of you, it is then up to you to provide an excellent service so that you keep their custom.

Word-of-mouth is still the best way of attracting new customers. If people get bad service, they will tell 9 times more people than if they get good service, so the odds are stacked against us. To get people talking, it is not enough to give consistently excellent service, you have to 'pull rabbits out of hats'. You have to do that little bit extra, whether it's getting the British Library to fax an urgently required document direct to the user that day or getting the full text of an article on computer because it's needed immediately. In a large company, you will get a ripple effect after such services, which will continue to bring in new users long after the original enquiry is forgotten about.

Problems

Help – I've been too successful – I have too much to do!

Everyone wants everything straight away... Yes, I do feel like that sometimes.

The obvious answer of 'get help' is not an option for most of us. If the library is treated as an overhead, then increasing the number of staff in the library, might push the unit's costs too high to be competitive and that would be bad news all round. However, there may be ways around that. For instance, part-timers are not included in the headcount for most firms. You may be able to get a student on fieldwork or for the summer. Or perhaps your users could do their own searches, whether on CD-ROM or online. I am a firm advocate of end-user searching.

Time management is a skill all managers need to master, in order to juggle all the requirements of their jobs. It is especially important for special libraries with small numbers of staff. In brief, you need to assess the amount of work to be done, assess which can be easily delegated or passed to an external library service and then decide on the priorities of the work you are going to do yourself. When taking down each enquiry, find out about the customer's priorities and the customer's deadlines. John Goodier of the Dept of the Environment suggests that information provision should take up 70% of one's time (GOODIER, 1991-2). If you spend more time shuffling paper around, perhaps you need additional training in organizational skills. Or perhaps you need to adjust your own priorities and let cataloguing, classification and filing take a back seat.

If you cannot do everything for everyone, then you have to decide what you can do and make alternative arrangements for the rest. 'Targeting decisions must be taken consciously', says Duncan McKay, 'otherwise they will be taken on a day-to-day basis in a haphazard, unplanned and potentially, for the unit, dangerous fashion,. They must also be changeable'. (McKAY, 1988) Equal access to information for everyone is an ideal which can only be met in ideal conditions. In the real world, some people will have to wait a little longer for their information. You need to know your resources and decide how to allocate them.

Cost

Whatever you do to promote your services will entail costs, even if it is only the cost of your time. You need to make sure that you get full benefit for the cost incurred. You should keep some brief records of usage so that you can measure the increase which results from the promotion.

There are a number of ways of controlling your promotional costs. You can have free advertising/PR in in-house newsletters. You can have the library included in someone else's brochures. You can have a stamp with a library logo made quite cheaply and use it on the general stationery – much cheaper than having special stationery printed. You can have coloured covers for your reports and use plain paper inside. You can make use of the promotional materials provided by database hosts eg Dialog's Outreach packages. Many hosts will also come along and host a demonstration or provide you with free passwords for demonstrations. It won't hurt to ask!

Conclusion

Promotion is vital to let people know what is available and get them using your services. If they are using only one of your services, make sure they know about the others. Try to be part of the in-house grapevine so people pass information to you and refer others to you. Try as many new ideas as you can so you can discard those that do not work in your situation.

Keep promoting your services so that even those who do not actually use them, know about them and about you. Make it easy for people to get in touch with you when they do need your help. Keep up to date with any new technology or information sources which will help you to cope with the additional use of the library brought about by your promotional activities.

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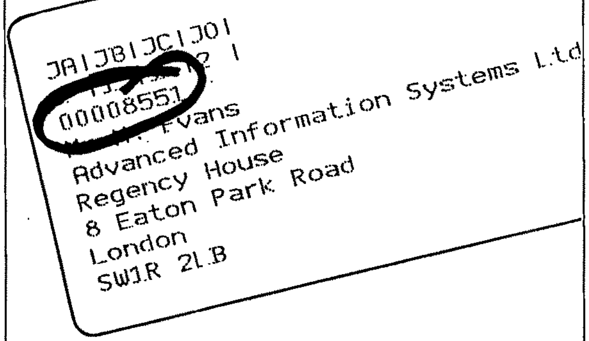

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Human resource implications of adopting IT

Bob Norton
British Institute of Management

Adopting IT

Adopting IT would usually imply implementing and applying some form of equipment for staff to use in order to achieve the objectives of the organization. Equipment would usually imply some form of computer hardware in possibly a local area network configuration, or perhaps a wide area network. In the past this may have been the cabling of dumb terminals located at the workplace to a central mainframe or minicomputer. In the future this may involve the networking of the new, exciting 486 processor with microcomputers in a more decentralized configuration. The 486 processor may well have quite a far-reaching impact not only on what staff can do and how they do it, but also on the DP/MIS/IT departments, as well as on the organization's budget.

Implementation will usually involve the testing, customizing and application of some kind of software, possibly DBMS, in order to integrate many of the information activities of the organization. It may also involve some kind of communications protocol within the network, and linking to the outside world perhaps via hard-cabling or via modem to the national and international data networks to connect to remote computers for whatever purposes – electronic mail, tele-conferencing, database searching etc.

What will have happened prior to the decision to adopt IT will, of course, be a process of review, an audit of information activities and functions that are required in order that they may contribute to the achievement of the organization's objectives. This will, in all probability, be a fairly lengthy consultation process. It is important to spend a good deal of time on this because if you get it wrong at the beginning, then the results will not be as expected: garbage in – garbage out. Expectations and requirements for now and for the future are important because if they are not specified, or if they are omitted, or more commonly, if they change *en route*, the system will not deliver what is really wanted. What happens is the system becomes caste in stone and tends to dictate to the users not only how they may do or not do certain things, but also create a working environment where "what is done" becomes a self-support system. 'We do this because we have always done it' and because the system can handle it well. If we push this to its logical, horrific extreme, then even the question, 'Why is this necessary?' becomes the prerogative of the unusually thoughtful person. Bob Garratt said in *The Learning Organization:*

> There is an inertia in most organizations which most outside the organization find hard to credit. The organizational "brain" may have been clinically dead for some time, but the organizational life-support machine is often kept on for years before someone finally throws the switch.

But I digress, so let us return to our onions, as they say in French.

The information audit

This consultation, or review, or audit process is usually carried out by a Systems Manager, probably from the DP/MIS/IT department, or by an IT consultant. I would argue that the team leader for the audit should carry the functions and expertise of an Information Manager. What is being handled at this stage is not so much systems as information and people. The system comes to definition at the end of the process. It is now fairly common knowledge – after much initial pain, learning and effort – that first of all you specify what you need to do, then you identify the software and finally the hardware. But it's never as simple as that – and that simple lesson still has to be re-learned many times, perhaps because of existing hardware or software configurations, because of vested interests, because of costs and because of lack of sound managment direction of the project. Often enough it is because the whole process is led by the IT department who know plenty about T but very little about the I. Arguably they know even less about the people who actually do the jobs. However, in a little more detail, the questions to be asked of the people who do the jobs would include:

- What information do you need?
- What do you need to do with it?
- Where do you get it from?
- How do you obtain it and how do you manipulate it or process it?
- What do you need to file? exchange? deliver? pass on? bin?

Often enough this basic, simple process breaks down. The people who actually do the job are insufficiently consulted in the early stages. At the later stages of course, budgets are beginning to be stretched, extra costs have arisen and the drive may well be on to

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cut costs and meet prescribed deadlines rather than check that people who actually perform the information activities are being satisfied that they are getting what they need to do the job. Often enough, in order to meet the budgets and deadline, this only comes as an afterthought.

IT and organizational change

However, let us move on from the basic information model to the implications on an organizational scale. Even if, or as, or when the basic information model breaks down, it (the information model) is simply not enough on which to base change on a persuasive scale, organizational change, as persuasive as the adoption of IT, signals. At the organizational level there needs to be a scheme or framework for handling or embracing change because organizational change is what adopting IT is all about. One such scheme or model is that proposed by Katz and Kahn (2) who propose that such change should deal with three basic questions:

1. What is the present state of the organization?
2. What is the preferred state?
3. By what means is it proposed to move from the present to the preferred state?

In short: where do we start, where are we going, how do we get there and who is doing it?

More fully, yet still in brief, the complete Katz & Khan model is as follows:

1. The point of entry – the origin of the change attempt.
2. The initial state of the system – the information audit.
3. The preferred state of the system – incorporating the goals of change.
4. The method of change – how is organizational change to occur.
5. The primary target – the subsystem or target procedure to which the method of change is immediately directed.
6. The hyothesized linkage – the impact on the rest of the organization.
7. The assessment of change – evaluation and measurement.

Technology, so we have discovered, is not the end, but the means to the end, and it impacts not only on the people who do the jobs and the structures in which they work, but also on the very jobs they do. We shall return to the hypothesized linkages, the impact or linking of technology to other organizational components later.

Managing the adoption

It has been said that implementing IT not only does *not* save money but that it is always more expensive than was originally planned. Often enough one of the major factors left out of budgeting and left as an aside to the IT function is the implementation process. The following questions should not be sideline but mainstream.

- Who is informing staff of proposed changes?
- Who is consulting staff for their views?
- How is the process of change being managed?
- What is the impact on current and future practice?
- What is the impact on current and future performance?
- Who is co-ordinating during the pilot phases?
- Who is looking after the training?
- Will training include a good overview of what the system is and will do and achieve or will it just involve the appropriate component part for that staff member?
- Is training designed to be of a purely technical nature 'to get the system going' or have normative developmental considerations been taken into account?
- Is there a 'learning' model? (see Bob Garratt...)

In the past, it can be argued, it is not information activities and the people who perform them which have been uppermost in IT planning, but technology and systems. It is not far-fetched to say that with the technological systems approach, certain dangers and damage have emerged:

- Decentralization and departmentalization. The left hand does not only not know what the right hand is doing but actually cannot shake it too easily – in the right way at the right time.
- Centralization. Power to the DP/MIS department. We've heard it all before – 'you can't do that because the system won't let you'.
- Inappropriate information products or activities; what once had a reasonable purpose, is maintained despite its lack of importance, because it has always been done.
- Inability to bring together information from a number of different sources in a coherent form.
- Dissatisfied people.

Socio-technical systems

In the introduction to the third edition of his *Understanding Organisations*[3] Charles Handy said that his book was an anthology of other people's works put together in his own words. He said that he would 'encourage anyone else to burn this book after reading it and start to write their own – it's the only way to really own the concepts.' Well, I didn't burn it but I make no apologies for leaning heavily for the rest of this paper on Elizabeth Orna's book, *Practical information policies: how to manage information flow in organisations* (4).

Orna's thesis is to put information and people at the top of the agenda because basically those are what the organization comprises. Inadequately, and far too simplistically, the argument is as follows:

1. What are the objectives of the organization?
2. What functions are required to achieve those objectives?
3. What information activities are required to perform those functions?

4. What people-skills are required to carry out those information activities?

If IT predominates, 'one of the bad consequences is that technological "solutions" developed without understanding of either the general abilities of human beings, or the specific nature of the tasks the solutions are meant to aid, or the knowledge of the people doing the jobs, are often inefficient in terms of their contribution to the tasks, and nearly always destructive in their use of human beings' ...in the past, it is argued ...'many (systems) were technically bad, they were almost all bad in human terms, they made work more routine, they increased controls, they forced many office workers, usually women, to spend all day inputting data into unfriendly machines'.

'Nor is it only staff at the lower levels whose human potential is sacrificed to badly designed technical solutions: since the early days, the technology has reached upwards in the past decade to affect management and professional work. Managers have been diminished as effective human managers and problem-solvers almost in proportion to the extent that they have been pressured to accept information systems based purely on intellectualized models of individualized decision-making'.

Extreme cases of information systems constructed on such purely intellectualized lines have impacted on the public domain in recent years where the system or computer model has taken precedence and dictated a solution which proved to be wrong. The case of the meteorological office computer system over-riding both a phone call from Western Ireland and the judgement of experts to predict the unexpected – were both precursors to, although not causes, of the Great Storm of October 1987. Program trading and thousands of computer terminal screens linked together yelling "sell" were part and parcel of the stock market crash 3 days later.[5]

The technical system therefore should be positioned not as a control but as a tool, an aid, a means of carrying out those activities which target the organization's objectives. As a control the technical system targets high productivity but leads to dissatisfaction, and isolation for staff. People become data-processors and the "structure" of the system in which they are a cog leads to repetitive, inflexible activities. With the technical system as a tool, successful exploitation of IT depends upon the willingness and ability of the employees to use IT to engage in worthwhile tasks. Much depends on the initial design target for a system which must be capable of serving organizational goals. The planned process of change has to meet the needs of the people and the activities they are required to perform as major changes impact on their working lives. The success of the design of the system will hinge on the degree and level of participation of all the relevant people who will work the system. The system must take account of the need of people to co-operate effectively – and socially – in performing organizational functions, co-operation on vertical and lateral levels. The effective exploitation of IT requires a commitment on the part of the organization towards individual learning wherein the IT systems serve the needs of the organization by serving the functional needs of individual users in an acceptable way. With the technical system as a tool, work can be an enriching and co-operative experience which is not strictly paced or controlled. The job satisfaction it will provide will lead to the higher productivity required as the unique goal of the control system.

Two scenarios for IT

Orna provides two alternative scenarios for IT, one as it often is: moulding the users to fit the sytem, pretending that the system is a substitute for thinking, purchased by people who don't know the job of the people who will use it, implemented without proper explanation or appropriate training. The other, as it might be: based on understanding the real work situations and respecting how human beings work, related to meaningful tasks and objectives, based on appropriate task analysis and carefully presented with really useful training. System 1 results in demoralization and the insulting of human intelligence. System 2 can result in people and technology working together towards the organization's objectives where the users of the system become involved in making the decisions on organizational change. With a people-centred approach to IT it is incumbent on the organization to be aware of the skills, knowledge, levels of expertise and potential of the people who work for it. The system should target in its design, the use and exploitation of those skills and abilities at the highest level and not at the lowest, the most mechanistic. People responsible for specific tasks should contribute to defining how those tasks should be done and how they should be combined into jobs. The change process can have terrific yet unrecognized impact on jobs – adequate time must be given to explaining changes and securing commitment to them. The uses of technology must be planned so that people may contribute what they are best at. And of course the key to successful implementation is a planned and continuous training programme with the people concerned involved in saying what the training should be.

With a people-centred approach the organization needs to carry out an audit of human resources in relation to the information activities of the organization, an audit of people who:

- gather
- acquire
- analyse
- process
- add value
- transform data into information or information into knowledge
- transmit information
- create and design information products
- use information from inside or outside sources.

The initial investigation and audit of information activities should locate the key people working on information-related activities. But it is vital not to ignore activities such as those listed above at all levels and in many contexts from manufacturing to customer relations, from R & D to accountancy. Increasingly, this will account for most of the workforce.

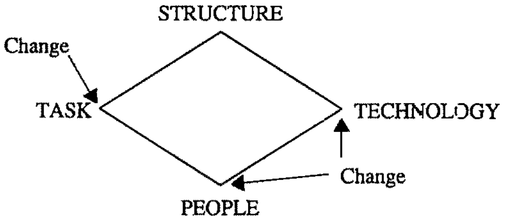
Orna's thesis involves the postulation of what is described as a socio-technical system. Here the design framework employs functional analysis to account happily for both technology and people wherein people are involved as "stakeholders" in the outcome. This is opposed to a technical system employing systems analysis to produce and deliver a technical service. The socio-technical approach has been clearly laid out by Ken Eason, in a book called *Information technology and organisational change*[6].

People implications of adopting IT

So what finally are the major summary implications on HRM of implementing IT?

First and foremost the adoption and implementation of IT should provide the opportunity not merely for specific technical training of all those concerned. but rather for aspects of development as part of a process of continuing change on a broader scale than merely the technological.

I mentioned earlier the linkages or interactions which occur as change takes place. This is best illustrated by Leavitt's Diamond[7]:



Leavitt's point is that these four organizational components are highly interdependent. Any change to one will automatically impact to a greater or lesser degree on the others. All too often this interlinking is not taken into consideration, or ignored. One can add further dimensions to the diamond link – with information both at the centre and, with the environment, at the outside.

Secondly, the human resource implications of implementing IT spell the end of the old command and control, mechanistic management which has dominated since the 1950s and found its most vital expression in Whyte's *The organization man* (8). Moreover it spells the end of people as numbers in boxes with formalized and inflexible job descriptions:

'Detailed, task-oriented job descriptions will be less important because the job will be changing all the time. In a sense, everyone will be doing the same job – lending their special skills and expertise to one project after another. In another sense, every job will be unique – people with different kinds of expertise will work on different sets of projects. Information systems will be able to account for the work each person does and the skills and experience he or she possesses'.[9]

Thirdly, the implications can serve to justify a debate on the very power-base of the organization.

Orna again:

> When it is human beings who are trying to cut other human beings down to the status of non-thinking cogs, human nature is very good at devising ways of mocking the pretensions of authority, saving it from the consequences of literal obedience to its rules, getting some enjoyment out of work and making an unworthy system function. But if human task-masters seek to supplement their controlling power by delegating some of it to a computer based system, the whole structure can start falling to pieces.

Such collapse, if nothing else, should lead the organization to 'debate the grounds of power and authority with subordinates, and perhaps even to consider new organizational forms and processes which incorporate self-imposed restraints on the centralized control made possible by technology.' This can easily cause problems within not only the culture of the organization but also in the ingrained culture of the individual. There are the managers and the managed and it is not organizations alone who do *not* want to disturb this demarcation. It's Bob Garratt's *Learning organisation* that we need here.

Finally I would suggest that the human resource implications of implementing IT have, by necessity, an impact on the culture, the structure and the management style of the organization. It is a starting-point to have a good look at how the organization is managed by asking:

- if people are required to be kept in defined boxes or whether initiatives, flexibility and development are encouraged.
- if collective and co-operative sharing are valued and encouraged as a positive, constructive feature, or seen as a threat.
- if there are token or real practicable policies on staff development and training. Or is it always the first cut when budgets are squeezed?
- if different functions and departments keep themselves to themselves or is there free interchange and exchange between them?
- does information come from the top down, with responses, if any, going back up through recognized channels, or doesn't it come down or go back up at all?

It is arguable therefore, in the final analysis, that the human resource implications for adopting IT are not only a question of technology planning but also a question of good information management; not only a question of good systems analysis but also of task analysis, communication and participation, not merely a question of systems planning but fundamentally a question of good management practice.

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Information design and information services
What information professionals should know about design, in order to deliver value-added information products

Liz Orna
Orna Stevens Associates

A paper presented at an evening seminar of the Aslib Social Services Group (ASSIG) held on the 3 June 1992 at Information House.

This article is essentially a practical one, though the occasion for the talk on which it is based was a rather theoretical article (Orna & Stevens, 1991) about common ground between information scientists and information designers. That in turn arose from thinking about our practical experience as a partnership combining the two disciplines over many years.

My purpose here is to try to demonstrate how information design can help information services to deliver the goods that will keep them in business, and to suggest the kinds of design knowledge and skill that information professionals need to add to their existing professional knowledge. It should be noted that I am not a professional designer, but an information professional who has many opportunities of working and talking with designers, and who is therefore perhaps in a position to build bridges between two specialisms which have much in common.

Adding value to information products

A key factor in the way that information professionals do their job today is the amount of added value they put into increasingly differentiated information products* to meet the needs of their "markets" and "customers".

Current awareness products are a good example of this trend; at one time current awareness meant circulation of press cuttings, periodical contents lists, acquisitions lists, and perhaps SDI of articles. Today, they are increasingly tailored for specific groups of users – at their most specialized, for single users; and information professionals use a combination of skills and technology to process and add value to what is presented, in order to meet highly specific needs and allow users to utilize the products with minimum further processing of their own.

To succeed with value-added products, we need to:

- Know about users and what they do
- Understand the nature of the information they need
- Have understanding and skills in:
  1. Conceptually organizing information – the traditional information professional's skill
  2. Visually organizing it – the traditional skill of the typographic designer, which is not much understood outside that profession.

Deeper than "creating a professional image"

The two kinds of skills in doing things with information together make up *information design* which we have defined elsewhere (Orna & Stevens, 1991) as:

> all the activities which go to making ideas visible, to showing their structure and the relations between them – so that others can use them and make them their own ... a special case of the general human activity of designing, which consists of finding an expressive structure that allows communication between human beings. It is special because:
> - the products have a high information content, usually expressed in words
> - information designers see users as an active initiating force who consciously know they want certain information, and who want it in order to use it for purposes they themselves have defined.

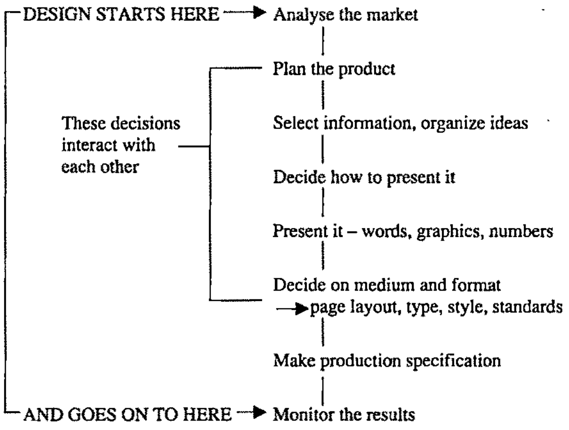
That definition of design is something much deeper than just applying surface visual treatment to give what non-designer writers about desktop publishing persist in calling a 'professional finish', or a 'professional image' (see for example Butcher, 1992 p.10), an approach to design which is primarily concerned with 'styling' and which has little or no sensitivity to content or to the user.

A marketing analogy

In fact the planning of information products has a lot in common with the marketing process.

Aslib Proceedings, vol. 44, no. 9, September 1992. pp. 305 – 308

1. Identify the target market:
   - Who are the potential users of the product?
2. Research its characteristics:
   - What do they do?
   - How do they do it?
   - Where do they do it?
   - What sort of information do they use?
   - What difficulties do they have in acquiring and managing the information they need for their work?
3. Decide on the nature of the product in the light of the findings:
   - What are the essential features it should have in order to meet the needs of the target market?
   - What constraints will it have to meet?
4. "Place" the product in relation to the objectives of the organization which plans to produce it:
   - How should it contribute towards achieving them?
   - What benefits is it intended to bring?
   - How will it promote and strengthen relations between the producer and the users?
5. Look for the optional combination of desirable features.
6. Work within the identified constraints and try to turn them to advantage.


DESIGN STARTS HERE
Analyse the market
Plan the product
These decisions interact with each other
Select information, organize ideas
Decide how to present it
Present it – words, graphics, numbers
Decide on medium and format
page layout, type, style, standards
Make production specification
AND GOES ON TO HERE
Monitor the results

The design approach for information professionals

If information professionals are to apply this "design approach" it implies for most of us:

1. Applying existing skills in conceptual organization of information in some new ways.
2. Combining existing knowledge of users and of information content with some new knowledge about how people process information and convert it into usable knowledge – and about what helps and what hinders them in doing so.
3. Adding some new knowledge and skills in the field of typographic design, and following through the implications in their use of technology to deliver products.

Applying existing skills in new ways

Last year I had the opportunity of analysing a large number of current awareness products from many different organizations, from an information-design point of view. The checklist I used was on the lines,

How easy does this product make it for the user to:

- Identify the different elements of information
- See what the content is about
- Scan the material
- Identify items of interest
- Follow them up

The analysis indicated that most of the people responsible for the products had a clear grasp of the need for logical sequence, and for ordering which is meaningful to the users, and that they understood that information is made up of distinct standard elements – like title, author, date, page numbers, summary, names, addresses, telephone numbers.

It also showed, however, that many of them had little idea that conceptual structure and individual information elements need to be made clear to the users by means of visual organization which echoes and reinforces the conceptual.

Some examples of this:

- Layout that makes it hard to distinguish subject headings and sources
- Inappropriate use of tabulated presentation (tabulation is fine for comparing sets of data, unhelpful for presenting items for scanning)
- Lines too long and type sizes too small for comfortable reading (see *line length*)
- Lack of running heads to show readers where they are
- Hierarchy of headings not clearly distinguished
- Unhelpful use of interline spacing – for example, the same spacing between subject sections as between items within sections
- Running on elements of information like title, author and journal so that they are hard to distinguish; centring of elements like journal titles, so that the eye has to adjust to multiple starting points for reading.

Combining existing and new knowledge

One of the great strengths of information professionals is their knowledge of users and of information content. The new knowledge that needs to be added to that relates to how people process information and convert it into useable knowledge, and to what helps and what hinders them in the business. Most people can, if asked, provide a pretty good list of their own pet hates in the way of information presentation that makes it hard to get at what's in there – from acres of grey text without headings, to type too small for legibility, and illustrations far away from the text that belongs with them.

The things that help and hinder are related to how well the structuring of ideas in words and through visual means fits in with the ways in which human beings convert external information that is important to them into internal, usable knowledge – integrated with their existing knowledge structure.

When we meet information which we need to turn into knowledge for our own purposes, this is what we try to do:

- Sort it into groups of related elements that we can fit into what we know already
- See patterns in it that relate to existing knowledge patterns.

In doing that we depend on memory, and memory easily becomes overloaded. When it does, it is difficult for us to turn information into knowledge. Anything that:

- Obscures patterns
- Makes it difficult to see the function of pieces of information
- Doesn't match our way of organizing our knowledge
- Follows an illogical sequence
- Leaves out or makes it difficult to find essential pieces of information

leads to memory overload and slows down, or in the worst case stops, our attempts to process information into knowledge (Waite, 1982, gives a useful account of research on the process). And users are sensitive to the 'costs' of the effort involved in reading information; they have been described as having a 'mental accounting system' that calculates the effort required to gain understanding, and if they feel it will put too much of a load on their memory they will quit further reading (see Gold, 1992).

Visual as well as conceptual organization can produce these effects; the way words and numbers are presented on the page can make bad conceptual organization yet worse, and can obscure or contradict good.

Adding new knowledge and skills in typographic design

Since shortcomings in visual organization can give unnecessary difficulties to users and make products less satisfactory, it is not a trivial problem. This is the area where some completely new knowledge is needed. Most of us are using information technology to deliver products, but technology of itself will not make them well-designed in the sense we have been discussing. The danger is, indeed, that its surface "polish" may blind its users to structural weaknesses.

These are some of the major things that non-designers need to understand about typographic design; the principles are based on well-founded research (for a continuous text, the best line length for comfortable reading is 65 – 70 characters, 10 – 12 words per line (when it comes to information that isn't in prose, but consists of discrete "information elements" – like bibliographic data, other principles apply, related to making it easy for the reader to distinguish the elements, as well as to relate them to the entity that they make up.)

Typefaces

The choice of typefaces also affects ease and comfort of reading. The internal spaces in letters (as in 'e', 'o' or 'g'), and degree of contrast between thick and thin strokes, are particularly important, because if text is to be photocopied, or subjected to other forms of low quality reproduction, small spaces are liable to fill in. Whatever typeface is chosen, it is important to understand that the appearance of typefaces will change according to the kind of output device used. Typefaces which look robust enough on a low-resolution laser printer could become weak if output at high resolution.

With laser printers, where the resolution is 300 dots per inch (dpi), the smaller the type, the fewer the bits of the underlying shape that can be reproduced. So in small sizes, parts of letters disappear, or inner counters fill in. At large sizes (eg 72 point) the image is represented by the full 300 dpi and so it is better, though curves will show a certain unevenness. To overcome these limitations of present laser printers, fount manufacturers have produced typefaces which are more robust in their design and are thus less likely to degrade when printed. These should be used if the material is not going to be reproduced on high-resolution image setters.

Type size expressed in the traditional measure of points has only a nominal relationship to the appearing size. Different faces of nominally the same point size vary greatly in x height (the height of letters without ascenders, like 'x') and in legibility. It is the x-height which determines how large or how small a typeface will appear. Readers can easily verify this for themselves by running out alphabets in a range of the typefaces available on their own word processing packages.

This experiment will also show that the width of characters in different typefaces varies. As general principle, wider characters should be used for longer line, narrower for shorter.

Spacing between words, letters and lines

Words should be set close together so that they form an overall even texture. If the space between words is

A simple rule for legibility relates word and line spacing: 'the spaces between words should always be smaller than the space between lines' (Stevens, 1991).

The page
There are various ways in which pages can be divided into text areas and margins. The 'invisible underlying structure which guides the way that the pages are planned' (Stevens 1991) – the grid – gives a consistent framework for placing text and non-text elements. Horizontally, the grid is divided into lines, based on the size of type used plus the space between lines. Vertically, it is divided into columns, separated by a standard unit of space.

In deciding on a grid for any particular information product, we have to find a structure that will accommodate all the ways of presenting information that we need. At the same time it has to meet the needs of users for legibility and easy reading of different types of material. In books with continuous text, like novels, we can cope with line lengths that are close to the overall page width, though these line lengths (or text areas) must take into account the proportions of the page format, and, must have margins which follow underlying aesthetic principles. On the other hand, newsletters, bulletins, and other products that contain many different items of information which are not read continuously need to be organized in columns and boxes to help the reader. Designers deal with the requirements by "plotting" all the essential information elements in material to be dealt with, identifying the "worst possible case" of each, and then experimenting with alternative grids to find the "best buy" – the design solution which suits the users, the content, and the type of product.

Simplest is best

Whatever the sales pitch says about desktop publishing, the technology won't do the designing! It takes as long to train a professional designer as it does an engineer, an accountant or an information scientist! Those of us who are not trained typographic designers will get best results if we follow straightforward research-based principles, use DTP simply and modestly, and resist the temptation to go OTT!

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* Products that present information which people need for purposes they themselves have defined, eg, reference works, timetables, newsletters, bulletins, and those artifacts that have evolved as a result of new communication problems, brought about by new technology, and government legislation.

The Dickens House Museum Library: a hypermedia prototype

Colleen A Phelan

Abstract

The subject of a recent MA thesis in Library and Information Studies is the development of a prototype scholars workstation for presentation of materials, in a hypermedia format, from the Dickens House Museum Library, London. Type and number of materials is provided. Basic hypertext features and authoring attributes of the hypermedia software used, Guide 3.0 for Windows, are described and the time factors inherent in research, planning and development of such a project are emphasized. Elements of screen design are described and presentation of textual and visual materials are provided with accompanying illustrations of navigational pathways. Testing of the prototype is described, including the test sample, the questionnaire and evaluation form, and brief conclusions.

1. Introduction

This paper is based on an MA dissertion in Library and Information Studies whose subject is the design and development of a library application of hypermedia software.

The Dickens House Museum Library, located at 48 Doughty Street, London, is a rich resource on Charles Dickens with a collection of approximately 8,000 texts held in the Dickens House Classification Scheme; 800 Dickens letters along with an undisclosed number of family letters held in the Manuscript Collection; newspaper and journal articles numbering in the thousands and an abundance of ephemera (pamphlets, geneologies, public notices, etc.), held in both of the above collections; and also a Photographic Collection with an estimated 9,000 images.

A prototype scholars workstation in hypermedia format has been developed presenting examples of both textual and visual images from the library: 180 texts including various editions of three novels, *Oliver Twist, Little Dorrit,* and *Great Expectations*; critical works on the novels; histories on various period publications, publishers, illustrators, social issues, the Victorian period, theatre, Dickens' travels, his journalism and his public readings; his female characters; biographies of Dickens, of his children, and women; bound collections of edited letters, bibliographies on novels and on Dickens Studies, a thesis, an unpublished manuscript and film and stage adaptations of the selected novels.

Also included are 42 Dickens letters and 69 family letters, all full-text; 27 journal articles and 19 newspaper articles, Victorian to early 20th Century, also full-text; and 32 examples of ephemera. Also 58 photographic images are presented with images of Dickens and his family, his various homes, novel-related topographical images and novel illustrations.

2. The technology

2.1 Software

The hypermedia software used for the project, Guide 3.0 for Windows (from Office Workstations International Ltd, mouse-driven and running on Windows 3.0, a graphical interface file manager) has three key hypertext features – expansion, reference and note buttons – providing a basic hierarchical structure with strong indexing and cross-referencing features making it particularly suitable for library applications. For the author, the creation and integration of these buttons is easily mastered by reference to Guide's Users Manual – and practice. Furthermore, the Windows pull-down menus allow the application of various attributes to hypertext buttons, e.g. colour-coding as an *aide memoire* along with style and size of typeface. In this prototype, the expansion button is fuchsia, the reference button is blue, and the note button is red, making it easy for the user to remember and identify on screen. When the user clicks on one of these with the mouse, the following happens:

a) the expansion button, signified by a target symbol ⊕, literally expands on the screen displaying text which has been input, for the purposes of this project, in outline form allowing for the creation of indexes.

b) the reference button, signified by an arrow , creates links between information in the same document or in a separate document. In this project, reference buttons often make up indexing terms in expanded text and target specific materials. Users can browse through these indexes and decide whether to proceed further, often to full text materials.

c) the note button, signified by an asterisk *, allows brief definitions to "pop up" on the screen

Aslib Proceedings, vol. 44, no. 9, September 1992. pp. 309 – 318

(whilst holding down the mouse button) for quick reference material.

Guide's document metaphor holds benefits for both author and user: its integrated word-processor and WYSIWYG interface allows for easy and problem-free inputting of lengthy text presenting the end-user with the capability to view and scroll through full-text materials, a necessary feature for the Dickens House collection with its many letters and journal articles.

2.2 Hardware

An IBM compatible PC equipped with an Intel 386 microprocessor running at 25 MHz, a 130 Mbyte hard disc, 4 Mbytes of Random Access Memory, a keyboard and a mouse are recommended for development procedures. The final prototype required 12 Mbytes of hard disc storage space.

2.3 Visual images

All photographs and the Family Trees were imported into Guide 3.0 via a hand-held digital scanning device, the Scanman model 256 for IBM, manufactured by Logitech of California, and edited in its accompanying software, Ansel. A VGA driver was installed to accommodate grey scale images.

The Timeline was created in Freelance Graphics and imported directly into the prototype.

Hard copies can be obtained for both text and graphics.

3. Screen Design

Standard components of the screen design, providing a frame for text and graphics, are:

a) a control panel designed with the aid of templates from OWL and Guide's unique Logiix programming language and located flush-left bottom, with choices for HELP, GLOSSARY, BACKTRACK, HOME and QUIT
b) a title bar located at the top of the screen
c) a small navigational aid which is a miniature of the Home Screen and indicates which section of the system is currently activated. For example, if the user is viewing an image of Dickens' last home, Gads Hill Place, the Photographic Collection section lights up and the name of the section appears beneath. This is located at the lower right-hand corner
d) a scroll bar is provided on the right hand side of the screen if the text runs to more than one screen.

4. Control panel

a) HELP, though not context-specific, provides instructions for using the mouse, scroll-bar, hypertext functions, control panel and describes collection content.
b) GLOSSARY, also not context-specific, aside from providing meanings for symbols and hypertext buttons, gives in a-z order, abbreviations commonly used throughout Dickens Studies literature, e.g. CD for Charles Dickens, OT for Oliver Twist, etc.
c) BACKTRACK allows users to recall previously viewed screens thus establishing a "history" of navigation.
d) HOME allows users to return to the Home Screen at any time, and
e) QUIT allows users to leave the system.

5. Time factors

Examination and collection of materials was formally begun in June 1991 and closed at the end of October 1991 occurring simultaneously with learning Guide and inputting materials. Linking and editing of materials along with implementation of the control panel and other programming then proceeded until January 14, 1992, two weeks beyond the desired target date of December 24, 1991. The following is a summary of hours spent in various activities:

- 6 hours for preliminary review of materials
- 269 hours (4 months) choosing materials (including reading and photocopying)
- 861 hours (7 months) inputting (including format design, linking, screen design, and graphics design)
- 16 hours choosing and scanning photographs into system
- 14 hours programming (control panel, navigational aide)

This sum of 1166 hours, 166 working days, is 23 days longer than predicted by the author.

Inevitably, shortcuts were necessary and these were in the areas of screen design, proofreading and editing, and in the integration of some materials e.g. scanning handwritten letters and illustrations for two out of the three chosen novels. A perennial problem of hypertext projects is their unplanned-for immensity due to unrealistic expectations[1]. "Author" translates quickly into "multi-expert" in hypertext projects and the Dickens House project demanded the following expertise: researcher, typist/wp operator, technical writer, proofreader, editor, indexer, database designer, screen designer, programmer. Programming assistance was obtained for designing the control panel, navigational aide and displaying pictures.

6. Presentation of materials

It is not possible here to provide extensive demonstrations of screen views; the following examples, however, give an indication of basic retrieval facilities and formats for presentation of materials.

6.1 Home screen

A Home Screen provides eight main access points (reference buttons) to four specific collections, Dickens House Classification, Manuscripts and Other Papers, Photographic Catalogue and the Collected Editions Catalogue, and to four subject areas – the Novels, two

Family Trees (one for CD's wife, parents and siblings and another for his children), and a Timeline which outlines and accesses CD's five main life divisions – childhood, youth, early, middle and late careers – as well as his various activities and his novels, as illustrated in *Figure 1*.

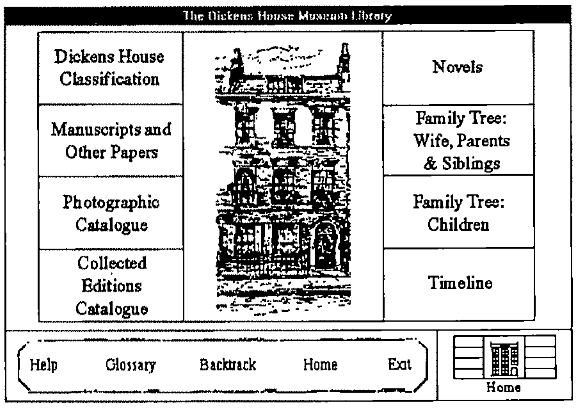
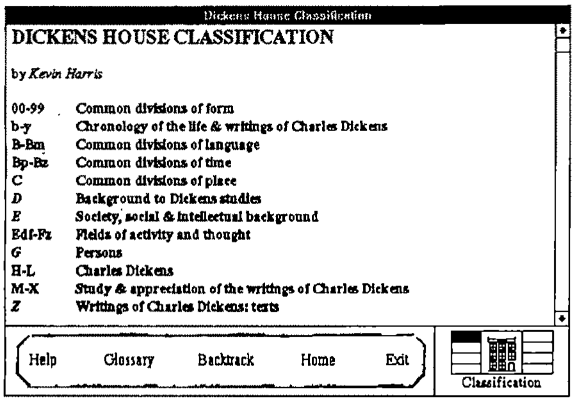

The Dickens House Museum Library
Dickens House Classification
Manuscripts and Other Papers
Photographic Catalogue
Collected Editions Catalogue
Novels
Family Tree: Wife, Parents & Siblings
Family Tree: Children
Timeline
Help
Glossary
Backtrack
Home
Exit
Home

Figure 1.

6.2 Specific collections

The Dickens House Classification, a faceted scheme designed specifically for literature collections, outlines and accesses materials in the 'general collection' of the library (CD's works, criticism, topographical texts, etc.) as illustrated in *Figure 2*[2]. The format consists of main divisions (expansion buttons) which when activated present more specific sub-topics, as illustrated in *Figure 3*[3]. Corresponding numerals and letters, main class numbers, on left of screen (reference buttons), access an index for materials found under that class, as illustrated in *Figure 4*, Kc-Kf – General Subject Relationships.

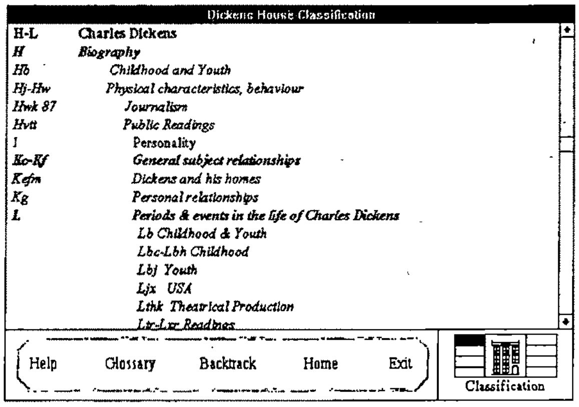


DICKENS HOUSE CLASSIFICATION

by *Kevin Harris*

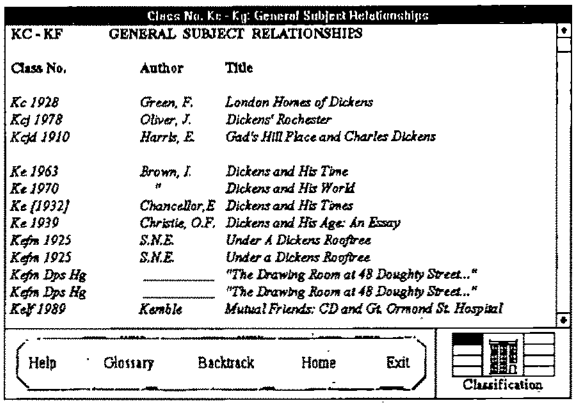
00-99	Common divisions of form
b-y	Chronology of the life & writings of Charles Dickens
B-Bm	Common divisions of language
Bp-Bz	Common divisions of time
C	Common divisions of place
D	Background to Dickens studies
E	Society, social & intellectual background
Edf-Fz	Fields of activity and thought
G	Persons
H-L	Charles Dickens
M-X	Study & appreciation of the writings of Charles Dickens
Z	Writings of Charles Dickens: texts

Figure 2.



H-L	Charles Dickens
H	*Biography*
Hb	*Childhood and Youth*
Hj-Hw	*Physical characteristics, behaviour*
Hwk 87	*Journalism*
Hvtt	*Public Readings*
I	Personality
Kc-Kf	*General subject relationships*
Kefn	*Dickens and his homes*
Kg	*Personal relationships*
L	*Periods & events in the life of Charles Dickens*
	Lb Childhood & Youth
	Lbc-Lbh Childhood
	Lbj Youth
	Ljx USA
	Lthk Theatrical Production
	Ltr-Ltz Readings

Figure 3.

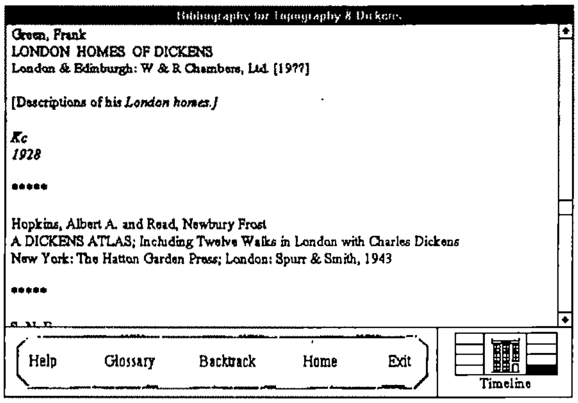


KC - KF GENERAL SUBJECT RELATIONSHIPS

Class No.	Author	Title
Kc 1928	*Green, F.*	*London Homes of Dickens*
Kcj 1978	*Oliver, J.*	*Dickens' Rochester*
Kcjd 1910	*Harris, E.*	*Gad's Hill Place and Charles Dickens*
Ke 1963	*Brown, I.*	*Dickens and His Time*
Ke 1970	"	*Dickens and His World*
Ke [1932]	*Chancellor, E*	*Dickens and His Times*
Ke 1939	*Christie, O.F.*	*Dickens and His Age: An Essay*
Kefn 1925	*S.N.E.*	*Under A Dickens Rooftree*
Kefn 1925	*S.N.E.*	*Under a Dickens Rooftree*
Kefn Dps Hg	________	*"The Drawing Room at 48 Doughty Street..."*
Kefn Dps Hg	________	*"The Drawing Room at 48 Doughty Street..."*
Kelf 1989	*Kemble*	*Mutual Friends: CD and Gt. Ormond St. Hospital*

Figure 4.

Such indexes are provided for each main class number in the Classification – as a quick reference for browsing and as a means of presenting an orderly table of contents bringing together like subject areas. Type of materials is unlabelled, e.g. book or article, but the latter is indicated by quotes around the title. For brevity's sake entries are kept to one line; lengthy titles use three dots to indicate continuance. Each entry is a reference button to its exact location in an annotated bibliography (where applicable) as illustrated in *Figure 5*. At this point the user can access the class number for entry into the Dickens House Classification, backtrack to previous screens or pursue further links if provided.



Green, Frank
LONDON HOMES OF DICKENS
London & Edinburgh: W & R Chambers, Ltd. [19??]

[Descriptions of his *London homes.*]

Kc
1928

•••••

Hopkins, Albert A. and Read, Newbury Frost
A DICKENS ATLAS; Including Twelve Walks in London with Charles Dickens
New York: The Hatton Garden Press; London: Spurr & Smith, 1943

•••••

Figure 5.

Manuscripts and Other Papers has two main access points for letters: 1) correspondence of Dickens and 2) correspondence of his family (expansion buttons) as illustrated in *Figure 6*.

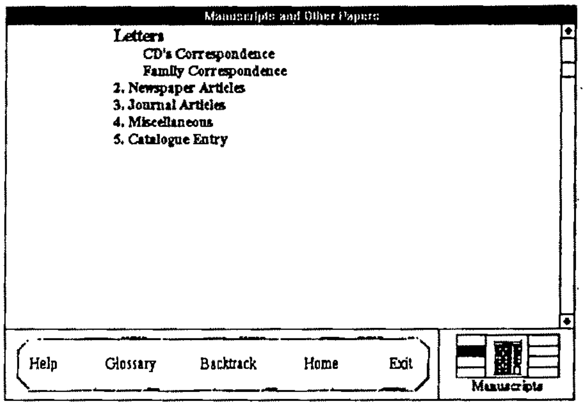


Figure 6.

Dickens' letters are accessed both by date and by correspondent (the recipient) (expansion buttons) as illustrated in *Figure 7*.

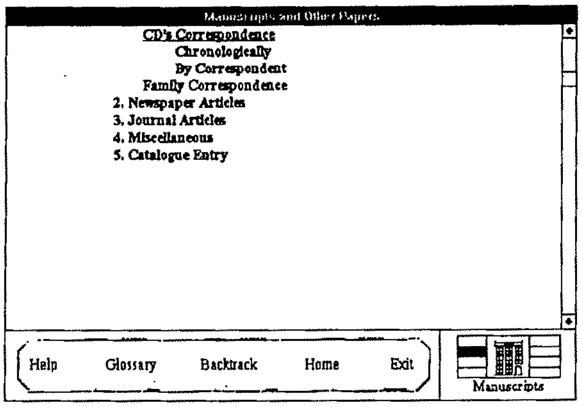


Figure 7.

The chronological layout divides into four of his biographical divisions (youth through late career) (reference buttons), as illustrated in *Figure 8*; each accesses its respective annotated index of letters.

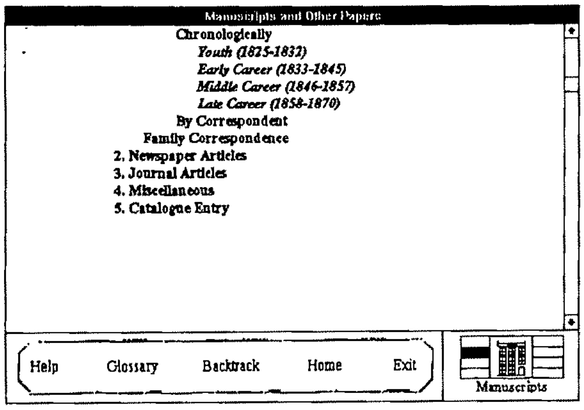
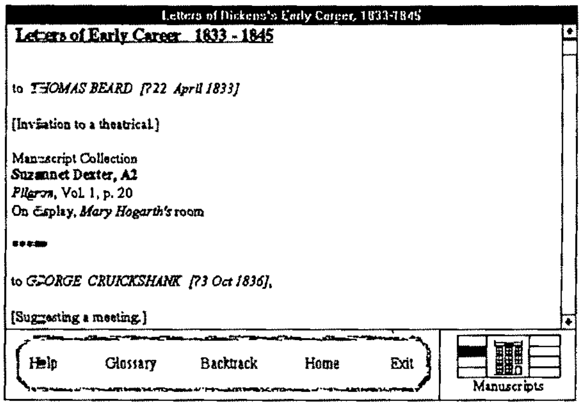


Figure 8.

Clicking on the recipient's name, e.g. 'George Cruickshank' in *Figure 9*, accesses the full-text letter, as partially illustrated in *Figure 10*.



Letters of Early Career 1833 - 1845

to *THOMAS BEARD [?22 April 1833]*

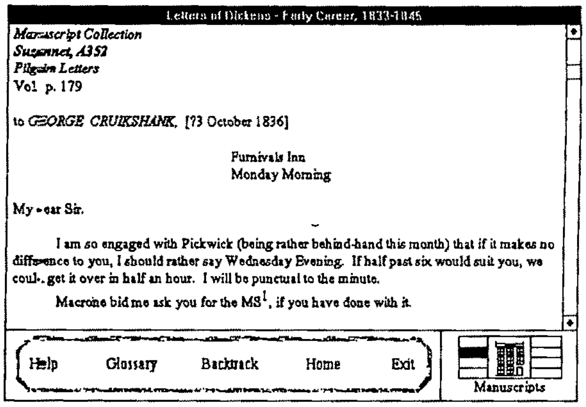
[Invitation to a theatrical.]

Manuscript Collection
Suzannet Dexter, A2
Pilgrim, Vol. 1, p. 20
On display, *Mary Hogarth's* room

to *GEORGE CRUICKSHANK [?3 Oct 1836]*,

[Suggesting a meeting.]

Figure 9.



Manuscript Collection
Suzannet, A352
Pilgrim Letters
Vol p. 179

to *GEORGE CRUIKSHANK*, [?3 October 1836]

Furnivals Inn
Monday Morning

My dear Sir,

I am so engaged with Pickwick (being rather behind-hand this month) that if it makes no difference to you, I should rather say Wednesday Evening. If half past six would suit you, we could get it over in half an hour. I will be punctual to the minute.

Macrone bid me ask you for the MS[1], if you have done with it.

Figure 10.

Accessing CD's letters by correspondent works in a similar fashion, as illustrated in *Figures 11* and *12*.

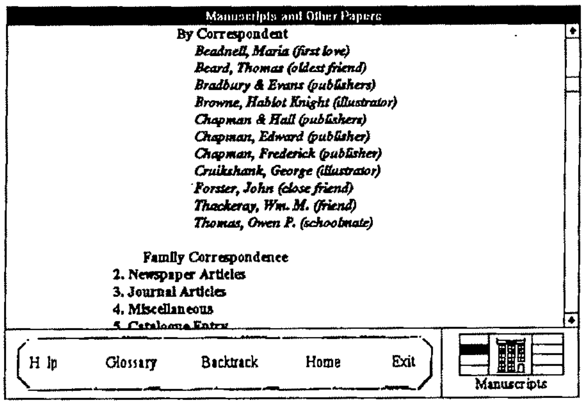
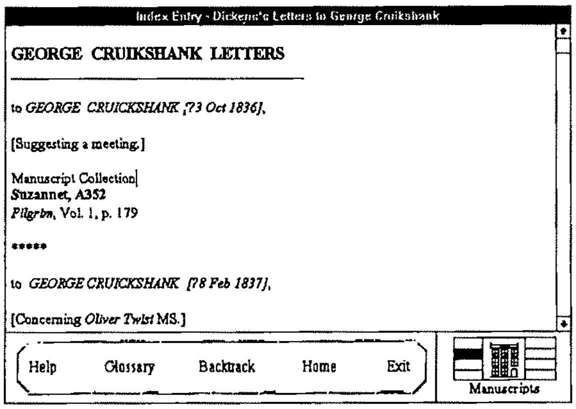

Manuscripts and Other Papers
By Correspondent
Beadnell, Maria (first love)
Beard, Thomas (oldest friend)
Bradbury & Evans (publishers)
Browne, Hablot Knight (illustrator)
Chapman & Hall (publishers)
Chapman, Edward (publisher)
Chapman, Frederick (publisher)
Cruikshank, George (illustrator)
Forster, John (close friend)
Thackeray, Wm. M. (friend)
Thomas, Owen P. (schoolmate)
Family Correspondence
2. Newspaper Articles
3. Journal Articles
4. Miscellaneous
5. Catalogue Entry
Help
Glossary
Backtrack
Home
Exit
Manuscripts

Figure 11.



GEORGE CRUIKSHANK LETTERS

to *GEORGE CRUICKSHANK [?3 Oct 1836]*,

[Suggesting a meeting.]

Manuscript Collection
Suzannet, A352
Pilgrim, Vol. 1, p. 179

*****

to *GEORGE CRUICKSHANK [?8 Feb 1837]*,

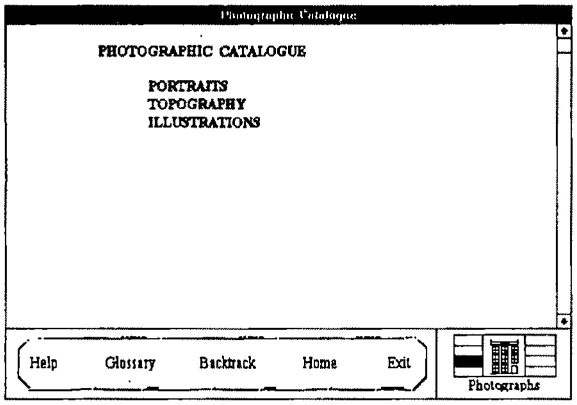
[Concerning *Oliver Twist* MS.]

Figure 12.

With all full-text letters there is always the option to scroll through the other letters for that personality as they are all held in one document, return to previous screen(s), access the specific Manuscript Catalogue entry for browsing e.g. Suzannet, Bradbury, etc., continue further into the hypertext system if such links are provided, return HOME, or QUIT.

The Photographic Catalogue has three main access points:

1) portraits, 2) topography and 3) illustrations (expansion buttons) as illustrated in *Figure 13*.

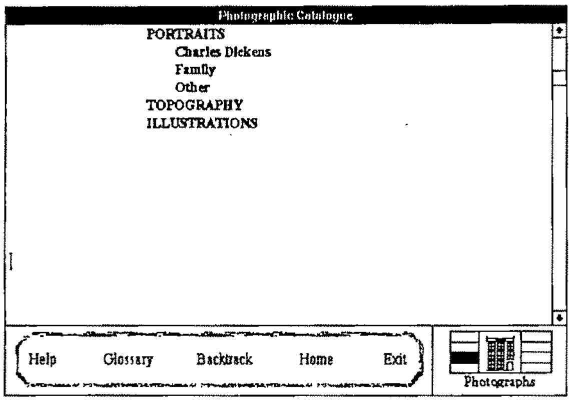


PHOTOGRAPHIC CATALOGUE

PORTRAITS
TOPOGRAPHY
ILLUSTRATIONS

Figure 13.

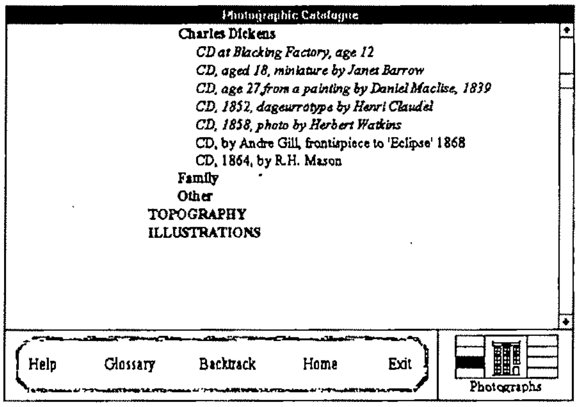
'Portraits' expands into three access points (expansion buttons): 'Charles Dickens', 'Family', and 'Other' as illustrated in *Figure 14*.



PORTRAITS
  Charles Dickens
  Family
  Other
TOPOGRAPHY
ILLUSTRATIONS

Figure 14.

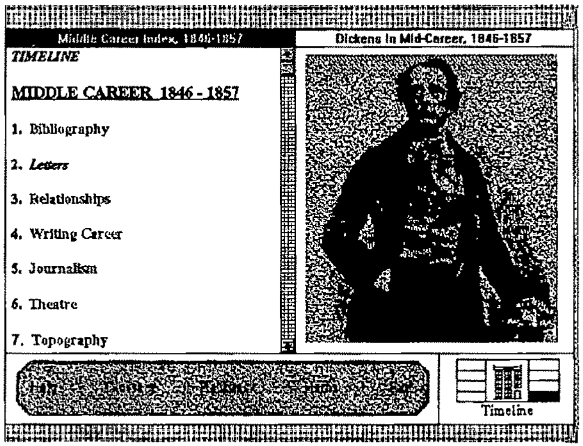
'Charles Dickens' expands to a list of portraits (reference buttons) each reflecting one of his five biographical divisions as illustrated in *Figure 15*.



Charles Dickens
  CD at Blacking Factory, age 12
  CD, aged 18, miniature by Janet Barrow
  CD, age 27 from a painting by Daniel Maclise, 1839
  CD, 1852, dageurrotype by Henri Claudel
  CD, 1858, photo by Herbert Watkins
  CD, by Andre Gill, frontispiece to 'Eclipse' 1868
  CD, 1864, by R.H. Mason
Family
Other
TOPOGRAPHY
ILLUSTRATIONS

Figure 15.

The chosen portrait e.g. 'CD, 1852, dageurrotype…' accesses that photograph with its accompanying biographical index as illustrated in *Figure 16*.


Middle Career Index, 1846-1857
Dickens in Mid-Career, 1846-1857
Timeline

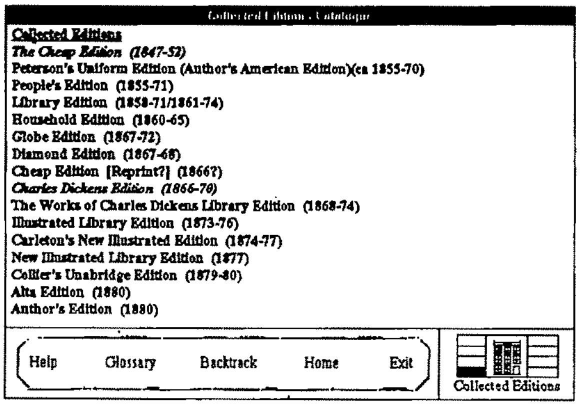
TIMELINE

MIDDLE CAREER 1846 - 1857

1. Bibliography
2. *Letters*
3. Relationships
4. Writing Career
5. Journalism
6. Theatre
7. Topography

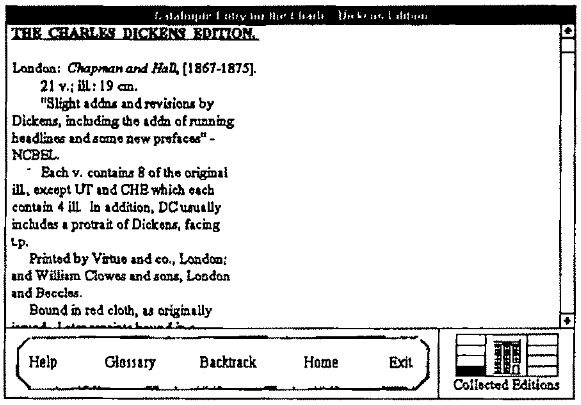
Figure 16.

The Collected Editions Catalogue contains a chronological list of specially published bound sets of Dickens' works (reflecting the museum's arrangement) as illustrated in *Figure 17*, each title a reference button accessing its respective catalogue entry as presented in the Dickens House Catalogue of Collected Editions, *Figure 18*[4].



Collected Editions
The Cheap Edition (1847-52)
Peterson's Uniform Edition (Author's American Edition)(ca 1855-70)
People's Edition (1855-71)
Library Edition (1858-71/1861-74)
Household Edition (1860-65)
Globe Edition (1867-72)
Diamond Edition (1867-68)
Cheap Edition [Reprint?] (1866?)
Charles Dickens Edition (1866-70)
The Works of Charles Dickens Library Edition (1868-74)
Illustrated Library Edition (1873-76)
Carleton's New Illustrated Edition (1874-77)
New Illustrated Library Edition (1877)
Collier's Unabridge Edition (1879-80)
Alta Edition (1880)
Anthor's Edition (1880)

Figure 17.


Catalogue Entry for the Charles Dickens Edition

THE CHARLES DICKENS EDITION.

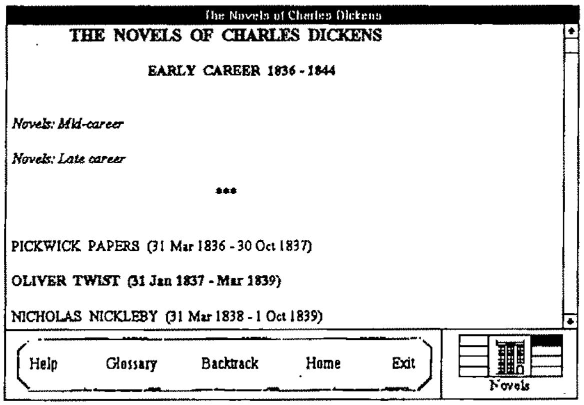
London: *Chapman and Hall*, [1867-1875].
21 v.; ill.: 19 cm.
"Slight addns and revisions by Dickens, including the addn of running headlines and some new prefaces" - NCBEL.
Each v. contains 8 of the original ill., except UT and CHE which each contain 4 ill. In addition, DC usually includes a protrait of Dickens, facing t.p.
Printed by Virtue and co., London; and William Clowes and sons, London and Beccles.
Bound in red cloth, as originally

Figure 18.

Background information is accessed by clicking on the title (note button) in the catalogue entry, e.g. 'The Charles Dickens Edition'. The user can access further topics via embedded reference buttons in the text of the catalogue entry (to publishers, novels, illustrators), view previous screens, go HOME or QUIT.

6.3 *Subject Areas*

'Novels' accesses a chronological list of CD's novels divided into cross-referenced sections labelled 'early', 'middle' and 'late' careers (reference buttons) as illustrated in *Figure 19*,


The Novels of Charles Dickens

THE NOVELS OF CHARLES DICKENS

EARLY CAREER 1836 - 1844

Novels: Mid-career

Novels: Late career

***

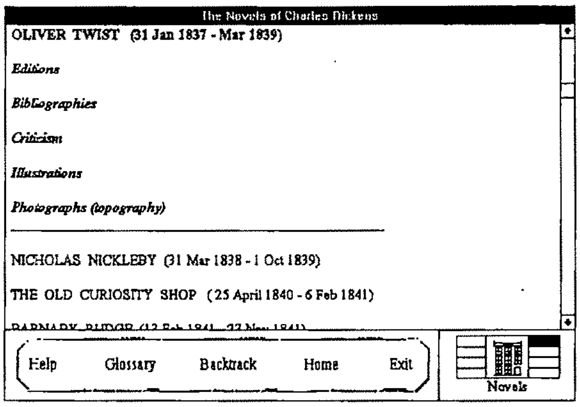
PICKWICK PAPERS (31 Mar 1836 - 30 Oct 1837)

OLIVER TWIST (31 Jan 1837 - Mar 1839)

NICHOLAS NICKLEBY (31 Mar 1838 - 1 Oct 1839)

Figure 19.

accessing bibliographical materials for each title. Each title is an expansion button which opens up at the top of the screen to display a list of access points for that title, e.g. Edition, Bibliographies, Criticism, Illustrations, etc. as illustrated in *Figure 20*.


The Novels of Charles Dickens

OLIVER TWIST (31 Jan 1837 - Mar 1839)

Editions

Bibliographies

Criticism

Illustrations

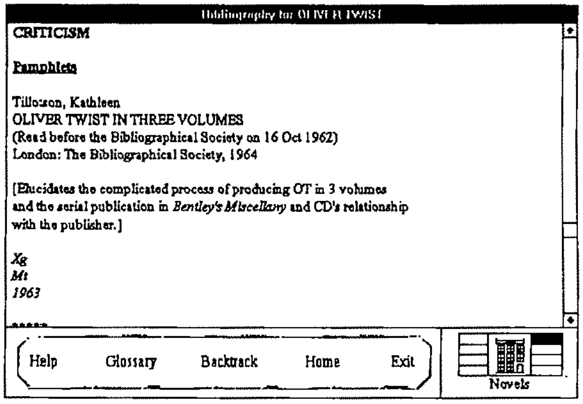
Photographs (topography)

NICHOLAS NICKLEBY (31 Mar 1838 - 1 Oct 1839)

THE OLD CURIOSITY SHOP (25 April 1840 - 6 Feb 1841)

Figure 20.

These are reference points allowing access to parts of that title's specific bibliography, and to illustrations or photographs as provided. Clicking on 'criticism' accesses the 'criticism' section of the bibliography for *Oliver Twist* as illustrated in *Figure 21*. The user can proceed to these targets or backtrack through previous screens, go HOME or QUIT.


Bibliography for OLIVER TWIST

CRITICISM

Pamphlets

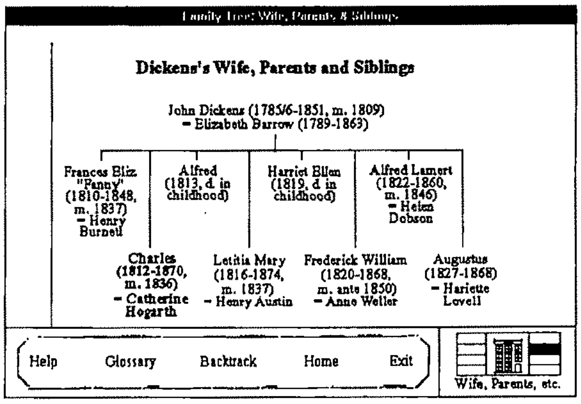
Tillotson, Kathleen
OLIVER TWIST IN THREE VOLUMES
(Read before the Bibliographical Society on 16 Oct 1962)
London: The Bibliographical Society, 1964

[Elucidates the complicated process of producing OT in 3 volumes and the serial publication in *Bentley's Miscellany* and CD's relationship with the publisher.]

Xg
Mt
1963

Figure 21.

There are two Family Trees: 1) Dickens, his wife, parents and siblings, in *Figure 22*[5] and 2) his children, in *Figure 23*[6].


Family Tree: Wife, Parents & Siblings

Dickens's Wife, Parents and Siblings
John Dickens (1785/6-1851, m. 1809) = Elizabeth Barrow (1789-1863)
Frances Eliz. "Fanny" (1810-1848, m. 1837) = Henry Burnett
Alfred (1813, d. in childhood)
Harriet Ellen (1819, d. in childhood)
Alfred Lamert (1822-1860, m. 1846) = Helen Dobson
Charles (1812-1870, m. 1836) = Catherine Hogarth
Letitia Mary (1816-1874, m. 1837) = Henry Austin
Frederick William (1820-1868, m. ante 1850) = Anne Weller
Augustus (1827-1868) = Hariette Lovell
Help
Glossary
Backtrack
Home
Exit
Wife, Parents, etc.

Figure 22.

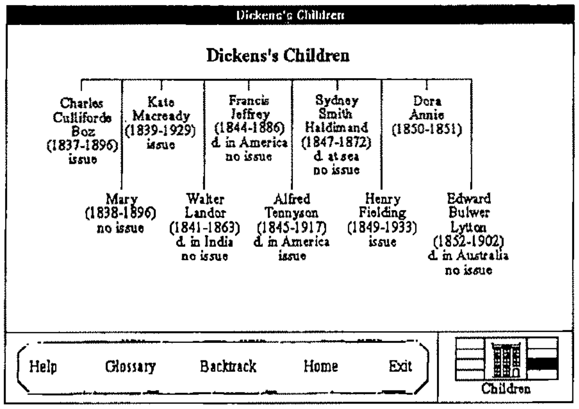
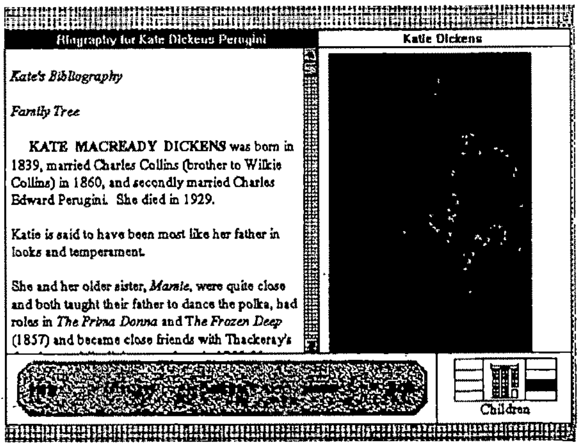

Dickens's Children
Dickens's Children
Charles Culliford Boz (1837-1896) issue
Kate Macready (1839-1929) issue
Francis Jeffrey (1844-1886) d. in America no issue
Sydney Smith Haldimand (1847-1872) d. at sea no issue
Dora Annie (1850-1851)
Mary (1838-1896) no issue
Walter Landor (1841-1863) d. in India no issue
Alfred Tennyson (1845-1917) d. in America issue
Henry Fielding (1849-1933) issue
Edward Bulwer Lytton (1852-1902) d. in Australia no issue
Help
Glossary
Backtrack
Home
Exit
Children

Figure 23.

Each name (reference buttons) accesses a biography and photo (selecting CD brings up his Timeline) as illustrated in *Figure 24.*



Kate's Bibliography

Family Tree

KATE MACREADY DICKENS was born in 1839, married Charles Collins (brother to Wilkie Collins) in 1860, and secondly married Charles Edward Perugini. She died in 1929.

Katie is said to have been most like her father in looks and temperament.

She and her older sister, *Mamie*, were quite close and both taught their father to dance the polka, had roles in *The Prima Donna* and The *Frozen Deep* (1857) and became close friends with Thackeray's

Figure 24.

Access points are provided to individual biographies, the respective Family Tree with options for BACKTRACK, HOME or QUIT or related items in embedded text.

The vertical Timeline for Charles Dickens, *Figures 25* and *26*, divides into his five biographical divisions (reference buttons); shown concurrently are specific areas, e.g. publications, public readings (reference buttons) and a chronological listing of novels (reference buttons). The Timeline gives the user several access points into the system: novels, Dickens' biographical indexes, specific areas and activities of his life; also, in itself, it gives an immediate sense of the time period and intensity of Dickens' life.

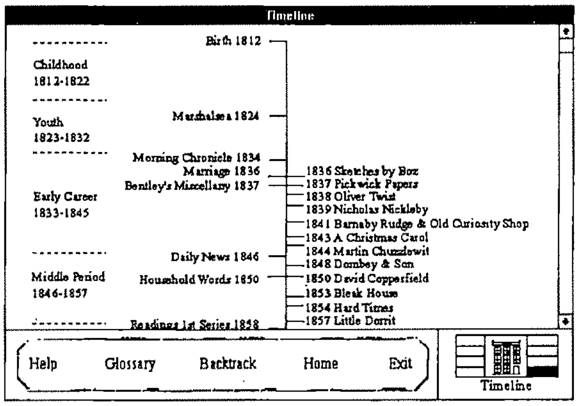


Figure 25.

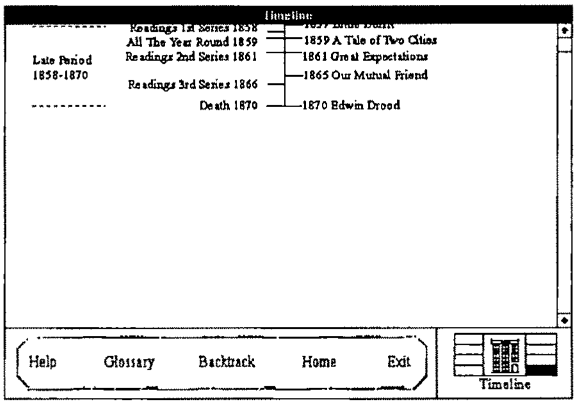
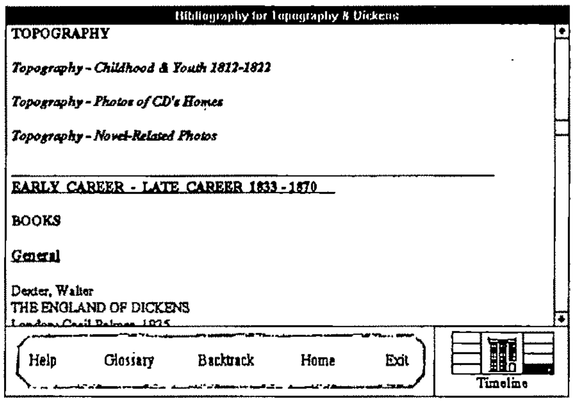


Figure 26.

6.4 Other Materials

There are several bibliographies – individuals (aside from CD), topography, journalism, theatre, public readings, travels, publishing and illustrators – with their formats determined by their subject and type of assembled materials. For example, topography's bibliography divides into books and journal articles. These, in turn, have divisions of 'general', *Figure 27*, (comprehensive treatments of areas) and specific (Kent, etc.). There is cross-referencing between the two main life sections, 'early career – late career' and 'childhood & youth'. Reference buttons are provided at the top of each section to other topography-related materials.



TOPOGRAPHY

Topography - Childhood & Youth 1812-1822

Topography - Photos of CD's Homes

Topography - Novel-Related Photos

EARLY CAREER - LATE CAREER 1833 - 1870

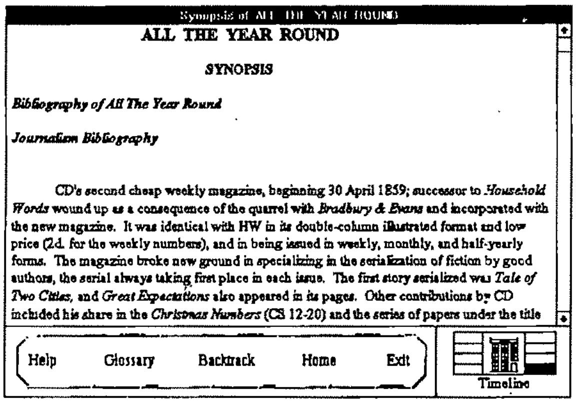
BOOKS

General

Dexter, Walter
THE ENGLAND OF DICKENS

Figure 27.

Periodical publications edited by CD such as *All The Year Round* are treated in the following manner. The synopsis is the first document, *Figure 28*[7], with reference points at the top of the page, to the title's bibliography, *Figure 29*, and to the journalism bibliography, *Figure 30*. There are also reference points embedded in the text to take the user to related topics, e.g. illustrators, novels, etc. CD's publishers, e.g. Chapman & Hall are treated in a similar manner as illustrated in *Figures 31*[8] *and 32*.



ALL THE YEAR ROUND

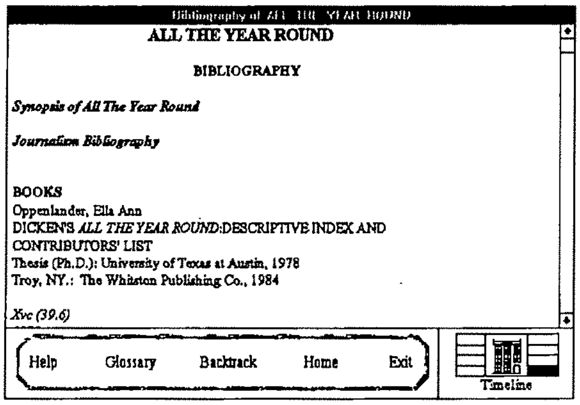
SYNOPSIS

Bibliography of All The Year Round

Journalism Bibliography

CD's second cheap weekly magazine, beginning 30 April 1859; successor to *Household Words* wound up as a consequence of the quarrel with *Bradbury & Evans* and incorporated with the new magazine. It was identical with HW in its double-column illustrated format and low price (2d. for the weekly numbers), and in being issued in weekly, monthly, and half-yearly forms. The magazine broke new ground in specializing in the serialization of fiction by good authors, the serial always taking first place in each issue. The first story serialized was *Tale of Two Cities*, and *Great Expectations* also appeared in its pages. Other contributions by CD included his share in the *Christmas Numbers* (CS 12-20) and the series of papers under the title

Figure 28



ALL THE YEAR ROUND

BIBLIOGRAPHY

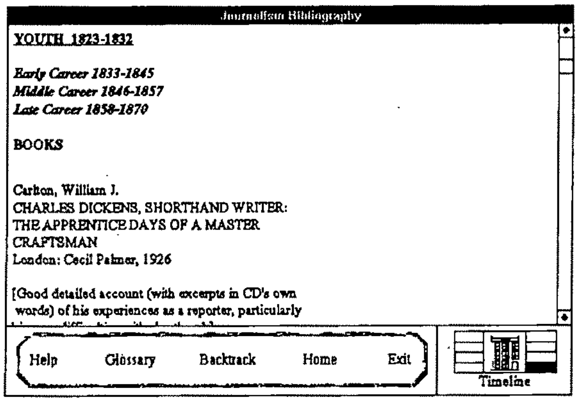
Synopsis of All The Year Round

Journalism Bibliography

BOOKS
Oppenlander, Ella Ann
DICKEN'S *ALL THE YEAR ROUND*:DESCRIPTIVE INDEX AND CONTRIBUTORS' LIST
Thesis (Ph.D.): University of Texas at Austin, 1978
Troy, NY.: The Whitston Publishing Co., 1984

Xvc (39.6)

Figure 29



YOUTH 1823-1832

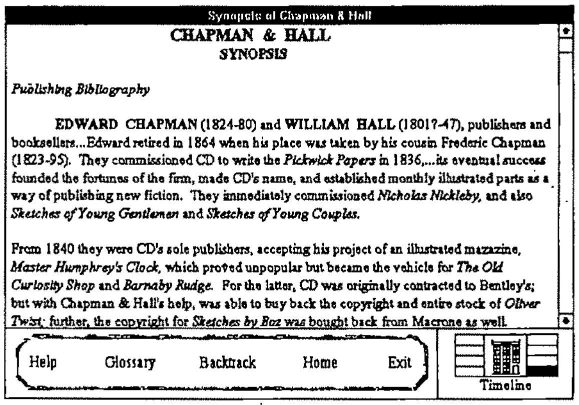
Early Career 1833-1845
Middle Career 1846-1857
Late Career 1858-1870

BOOKS

Carlton, William J.
CHARLES DICKENS, SHORTHAND WRITER: THE APPRENTICE DAYS OF A MASTER CRAFTSMAN
London: Cecil Palmer, 1926

[Good detailed account (with excerpts in CD's own words) of his experiences as a reporter, particularly

Figure 30



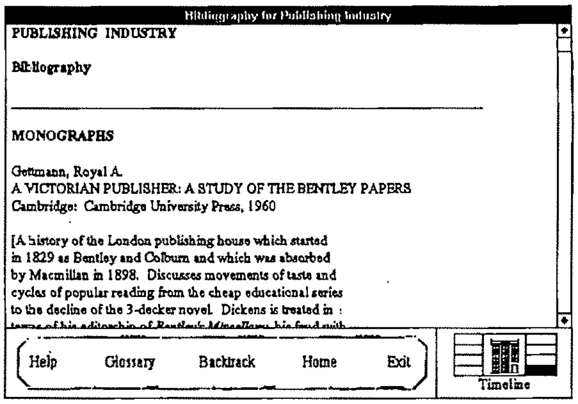
CHAPMAN & HALL
SYNOPSIS

Publishing Bibliography

EDWARD CHAPMAN (1824-80) and **WILLIAM HALL** (1801?-47), publishers and booksellers...Edward retired in 1864 when his place was taken by his cousin Frederic Chapman (1823-95). They commissioned CD to write the *Pickwick Papers* in 1836,...its eventual success founded the fortunes of the firm, made CD's name, and established monthly illustrated parts as a way of publishing new fiction. They immediately commissioned *Nicholas Nickleby*, and also *Sketches of Young Gentlemen* and *Sketches of Young Couples*.

From 1840 they were CD's sole publishers, accepting his project of an illustrated mazazine, *Master Humphrey's Clock*, which proved unpopular but became the vehicle for *The Old Curiosity Shop* and *Barnaby Rudge*. For the latter, CD was originally contracted to Bentley's; but with Chapman & Hall's help, was able to buy back the copyright and entire stock of *Oliver Twist*; further, the copyright for *Sketches by Boz* was bought back from Macrone as well.

Figure 31



PUBLISHING INDUSTRY

Bibliography

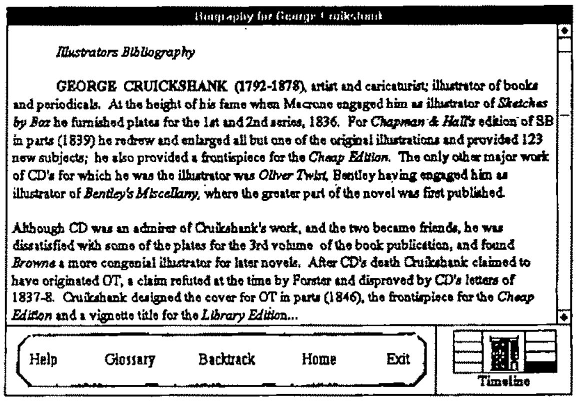
MONOGRAPHS

Gettmann, Royal A.
A VICTORIAN PUBLISHER: A STUDY OF THE BENTLEY PAPERS
Cambridge: Cambridge University Press, 1960

[A history of the London publishing house which started in 1829 as Bentley and Colburn and which was absorbed by Macmillan in 1898. Discusses movements of taste and cycles of popular reading from the cheap educational series to the decline of the 3-decker novel. Dickens is treated in

Figure 32

CD's illustrators are treated individually with synopses and a reference button to the illustrators bibliography, *Figure 33*[9]. This document in turn has three reference buttons at the top to the two main illustrators and to the illustrations catalogue as illustrated in *Figure 34*.

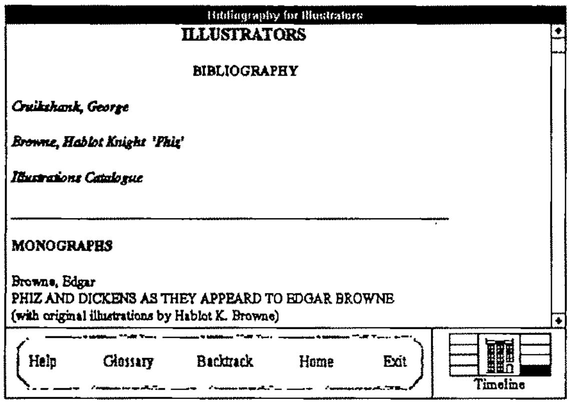


Illustrators Bibliography

GEORGE CRUICKSHANK (1792-1878), artist and caricaturist; illustrator of books and periodicals. At the height of his fame when Macrone engaged him as illustrator of *Sketches by Boz* he furnished plates for the 1st and 2nd series, 1836. For *Chapman & Hall's* edition of SB in parts (1839) he redrew and enlarged all but one of the original illustrations and provided 123 new subjects; he also provided a frontispiece for the *Cheap Edition*. The only other major work of CD's for which he was the illustrator was *Oliver Twist*, Bentley having engaged him as illustrator of *Bentley's Miscellany*, where the greater part of the novel was first published.

Although CD was an admirer of Cruikshank's work, and the two became friends, he was dissatisfied with some of the plates for the 3rd volume of the book publication, and found *Browne* a more congenial illustrator for later novels. After CD's death Cruikshank claimed to have originated OT, a claim refuted at the time by Forster and disproved by CD's letters of 1837-8. Cruikshank designed the cover for OT in parts (1846), the frontispiece for the *Cheap Edition* and a vignette title for the *Library Edition*...

Figure 33



Bibliography for Illustrators

ILLUSTRATORS

BIBLIOGRAPHY

Cruikshank, George

Browne, Hablot Knight 'Phiz'

Illustrations Catalogue

MONOGRAPHS

Browne, Edgar
PHIZ AND DICKENS AS THEY APPEARD TO EDGAR BROWNE
(with original illustrations by Hablot K. Browne)

Figure 34

6.5 Multiple access points

A strong component of a hypertext system is its multiple access to a single topic. For example, Dicken's letters can be accessed through various pathways:

1) via Manuscripts and Other Papers with its two main access points of date and correspondent for CD's letters.
2) via Dickens House Classification which has a class number for letters;
3) via the Photographic Collection which accesses CD's portraits with accompanying biographical indexes within which is found 'Letters'. Clicking on 'Letters' accesses his letters for that period.
4) The Family Tree accesses the Timeline which further accesses the individual biographical indexes with letters obtained as above and
5) choosing the Timeline directly accesses letters as described above.

7. Evaluation

An in-depth report on the testing and evaluation procedure is not possible in this paper, however, the following draws out the main components of the exercise.

7.1 Test sample

A convenient, small and biased test sample (9 postgraduates in Information Studies and 1 professional librarian), all with recent online experience, tested the prototype for 27 consecutive days during March 1992 at the computer laboratory of the Polytechnic of North London. (Due to time constraints there was no pilot test nor was it possible to test the intended end-user, the Dickens researcher at the museum library). The purpose of the testing was to provide in-depth qualitative investigation and analysis as required of a system with such a variety of components and with an expected limited test sample. Thus quality of testing results, e.g. comments had a strong impact on conclusions. In fact, a single distinctive comment could prove important. Components of the prototype evaluated were screen design, user's aids and controls, organization and accessibility of materials, and cognitive aspects of the system.

7.2 User Questionnaire

A user questionnaire and evaluation form was provided which divides into three sections:

1) 'Background Information' on test sample: personal details, familiarity with Dickens, hypertext knowledge, experience with Windows
2) 'Assigned Searches' intended to utilize the eight sections of the Home Screen leading to further use and analysis of the database, including navigational routes, and use or non-use of HELP.
3) 'Evaluation' of 19 topics, using a rating scale (1 to 5 = unacceptable to excellent) and a comments page on each component of the prototype including screen design, control panel, hypertext features, Windows attributes, bibliographical materials and bibliographical presentation.

7.3 Conclusions

In brief, testing revealed that the system's strong points are its organization of indexes, its photographic collection, its familiar paper-document presentation of bibliographies and full-text materials and its backtrack facility.

The system falls short in its lack of context-specific HELP, a largely useless navigational aid, presentation of the over-complex Dickens House Classification Scheme, excessive steps to full-text materials, and an over-dependency on users' intuition; users need and want guidance as to what to do and how to do it. Further criticism can be levelled at the lack of access points in the HOME SCREEN that are found elsewhere, e.g. topography, personal relationships, scholarly criticism.

Re-design should provide for first steps which give confidence to the user, and a more concise description of database contents, cross-referenced indexes in separate documents, specific instructions on use of all features and searching strategies, and more descriptive navigational aids, perhaps a map, showing where the user is and where he/she can go.

The ultimate goal is to create a balance whereby the inexperienced Dickens researcher is provided with concrete contents information and messages on system use to enable him to feel secure and confident, and the seasoned Dickens Scholar, knowledgeable about Dickens House terminology, can be given a means to bypass the obvious and get to desired information rapidly.

Acknowledgements

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2. HARRIS, Kevin. *The Dickens House Classification. Research Report No. 18.* London: The Polytechnic of North London, School of Librarianship and Information Studies, 1986, p. 17.

3. ibid., 52-53

4. *Dickens House Catalogue of Collected Editions.* Unpublished. Unpaginated.

5. *Dickens Chronology and Family Tree.* London: The Dickens House, 1985.

6. ibid.

7. BENTLEY, Nicolas et al. *The Dickens Index.* Oxford and New York: Oxford University Press, 1990, p. 4-5.

8. ibid., 46.

9. ibid., 67.

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Quality, Standards and the Implementation of Technology in Translation

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Information management in context

Allan Taylor and Stephen Farrell
Department of Business Information Management, Napier University

Organizations' information universes may become a little less opaque as IM moves towards an effective model for the analysis of the information resource.

1. What is information management?

There is no universal definition of In3formation Management (IM) despite numerous discussions over the last decade about the meaning, content and use of IM in many disciplines. This is not to say, however, that a concept of IM is not developing. Indeed, three types of definitions (two of which are not dissimilar) have so far emerged from the literature: *existential* (the origins and elements of IM), *operational* (management of the information resource for strategic corporate objectives) and *hybrid manager* (organizational response to developments in information technology). [1,2,3] This may cause some confusion about the nature of pure IM, but the key is to realize that its roots and possible development lie in a number of disparate but converging professional fields.

There is a growing perception that information management identifies, coordinates and exploits information entities in an organization for the purpose of using the characteristics of that information to achieve greater value (of existing information resources) and to gain advantage over competitors. This concept exists apart from technology, though this is often misunderstood: the use of information technology is nothing more than a sign of the times, as technology is not a prerequisite for IM. In fact, information management has been used in military, political and business tactics for millennia.[3,4]

In a business context, control of the information environment can be equated to control of the organization for strategic purposes. Accurate, timely and relevant information about the economy, market, technology, attitudes of customers and actions of competitors, etc is essential for business growth and survival.[3] The use of IM components like information economics (value-linking, value-restructuring) and knowledge management (knowledge-base approaches to decision-making), etc improve an organization's competitive posture as well as create new market niches for its goods and services.

Technologically, as Cronin and Davenport describe in the seminal work *Elements of information management* (1991), IM relies on codified knowledge (symbols, patterns, algorithms) to produce formal representations of information entities which allow the automation of transaction processing, decision making, and information retrieval, etc.[1] An information manager will not only use appropriate modelling techniques (attributes, flows and relationships), but will exploit information to satiate organizational objectives by directing information resources towards achievement of results.[1,5]

2. How can information be managed?

Information is vital in business organizations for innovation, goods and services to be turned into profit and for this process to be monitored and controlled at top-level.[3] But how can information be managed to realize this? Information can be managed because models capture (quantitatively and qualitatively) complex business problems through formal representation in data structures, e.g. procedural or syntactic. These representations help describe present and future situations in the real world, and can range from a simple spreadsheet to a program designed to meet specific strategic organizational criteria, etc.[1]

Cronin and Davenport identify three types of models in IM: *metaphors* (use of descriptors like resource, weapon, asset); *metonyms* (representation through icons, keywords, abstracts, etc) and *taxonomies* (classification schemes, eg. hierarchic and semantic).[1] A fourth might be *synonyms* (where things have the same or similar meaning eg. thesaurus and nearest neighbour indexing).[6]

These information activities provide a basis for building methodologies where they formalize what cannot be directly observed or controlled.[1] Models create a problem space in which the problem-solver can operate, where the form of model depends on how a problem is conceived and abstracted, and on the presentation medium used, e.g. just as DOS was the computer medium of the 1980s which relied on command-line input for file manipulation, Windows is the medium of the 1990s where programs can be run by clicking "books" on shelves, or files can be deleted by dumping them in the bin, etc.[7,8] As expressed by Olaisen and Johannesen, metaphors are used 'from strategic to creative management'[9] through "what if", simulations, scenarios, forecasting and planning. Other activities also make use of metaphors to convey human attributes, e.g. e-mail (which can be regarded as a kind of *conversation*), computer conferencing (an electronic *debate* to connected parties), and file distribution (a form of *presentation* to distributed members).[10]

Such symbolisms rely on human cognitive processes as well as underlying technologies to facilitate the

Aslib Proceedings, vol. 44, no. 9, September 1992. pp. 319 – 322

shift from reactive to proactive management. The relationship between people and technology is crucial not only for communication, but for business growth, where new ways must be found for adding value to existing resources.[10] As Peters suggests, people are a company's most important asset and their effective communication and performance relies on accurate information.[11] Information management, in this context, brings together people and technology to create wealth through information modelling.[10]

3. Popular misconceptions about IM

IM is not:

managing information systems (IS)
end-user computing
information technology (IT)
systems analysis and design
data management

It is all of these things and more – summarized in a business, technological, socio-technological and academic inter-discipline which borrows from a range of methodologies to underpin its epistemology. This schema, however, is not fixed; it is not absolute, it is relativistic and phenomenological. This idea has been used to support evolutionary, soft systems approaches to the development of computer-based systems (some are humorous like Tipper's bath method for problem solving[12]), as research has indicated that hard traditional systems methodologies have failed to deliver the goods.[13]

There is often confusion about expressions used in IM:

> IT – is the acquisition, processing and dissemination of vocal, pictorial, textual information on micro electronics-based **computing technologies**.[14]
>
> IS – the organized collection, processing, transmission and dissemination of information in accordance with defined **procedures** – automated or manual.[14]
>
> IM – the exploitation and more efficient use of **information** for decision making and planning in an organization via IRM.[14]
>
> IRM – the planning, budgeting, organizing, directing, training and control of information (top management functions), where information is itself a **resource** (information resource entities (**IREs**) can be identified and mapped in an organization as shown by Horton and Bedell).[14,15,16]

Figure 1 shows IM in its technological context: the use of IT and IS can be seen as conduits for information flow and processes. Like cybernetics (used in biology and engineering) IM can be applied to non-technological applications as strictly speaking it is the theory, principles, use and management of information. IM is not technologically deterministic (though some users may perceive it so) but in an age of competition where competitors use technology, it cannot afford to ignore technological advances. However, it is important to distinguish between 'information technology' and technology *serving* information.

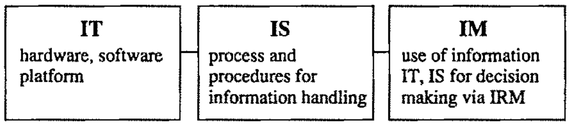
IT
hardware, software platform
IS
process and procedures for information handling
IM
use of information IT, IS for decision making via IRM

Figure 1. IT, IS and IM context typology

Possible components for an IM construct can be seen in Figure 2. It shows the disciplinary influences on IM and the possible sub-disciplines IM engenders. It is on the basis of similar typologies that a number of IM educational programmes have been developed in the US and UK.

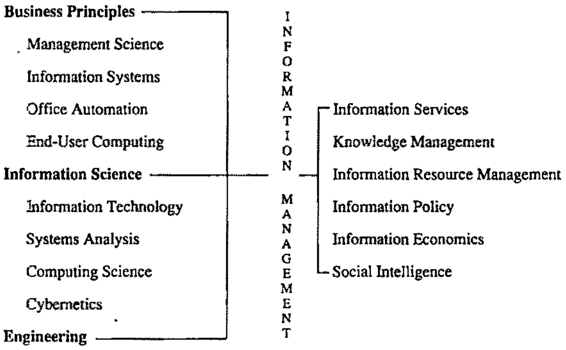

Figure 2. Typology of IM components

The IM perspective adopted will depend on the mix of disciplinary components (broadly categorized as *business principles, information science* and *engineering*). Bell's post-industrial society and the shift from goods production to knowledge generation has been marked by the pace of technology across the professions; each concerned with their own human and technical aspects of managing the information commodity.[17] The business perspective, for example, uses technology to produce results, e.g. to reduce costs, increase revenues, improve customer service etc, where the emphasis is on end-user aspects of managing information. In information science the accent is on information retrieval; and the use, testing, evaluation and characterizing of information systems; and in engineering, the architecture. This would explain the plethora of postgraduate educational courses which exploit different aspects of the IM typology, e.g. hybrid manager programmes spawned by MBA schools[18], information systems and software engineering courses offered by library, computing and engineering schools.

Similarly, the sub-disciplines IM engineers (Figure 2) may also differ depending on the mix of disciplinary components. Indeed, there is evidence that some are developing into inter-disciplines in their own right, e.g. social intelligence, which brings together ideas, techniques and insights from development studies, economics, behavioural and cognitive sciences etc in its own scholarly journal (*Social Intelligence*, Taylor Graham, 1991).[19]

4. IT as a black-hole for cash

The belief that IT managers do not understand business requirements is becoming more popular in business circles, and much anecdotal evidence suggests that investment in information technology is nothing more than an expensive black-hole for cash. Millions have been spent on hardware and 'shelfware" (ineffective or unused software) which in accounting terms has not increased an organization's revenues or decreased costs. The power of information systems are rarely exploited to their optimal capacity, in an analogous way to the human brain which may only use ten percent of its power in normal cognitive processes. Some believe that the more money they spend on a system, the better it must be, but in many cases the "*you get what you pay for*" rhetoric has been misleading; with development schedules and costs exceeding original estimates, and systems' performance failing to meet users' requirements. Yet many organizations pour good money after bad in IT investment, when it might have been better for them to re-invest in their primary activity, e.g. making cars, digging coal or providing a service, etc.

There is a critical mass of user acceptance for IT systems, and the information manager should encourage this by ensuring that the technology base is good value for money. In addition to being computerate, the manager must be an intra-entrepreneur, and exploit the information resource so that the organization remains strong in its market environment. If the technology fails to deliver, the information manager must expose it.

5. Information as a resource

The use of the metaphor "resource" when applied to information, implies that it can be managed at corporate level in the same sense as other resources like capital, labour and plant; though the remit is the management of knowledge rather than materials and the primary product is intelligence rather than goods. The resource does not have a sell-by date (though its value may vary over time) and neither is it used up when it is transmitted through the value-chain. Proper management of the information resource (just-in-time intelligence[20]) enhances both internal and external organization performance. The information manager as well as being an agent of change in an organization, will be responsible for: making an inventory of IREs, determining the criteria for recognizing IREs, classifying and attributing value to IREs.[5] Generally, the manager will administer and exploit the corporate corpus of knowledge through synchronization of the information function with the organization's needs and objectives.[1] But information is much more fuzzy (where intuitive variables may be used in decision-making) than these other resources. For example, it is easy to measure the productivity of coal miners, ie. tons of coal produced per man per man hours. But how do you measure the productivity of knowledge-base workers? What is produced in terms of output?

6. The challenge for IM

The challenge for IM is to convince the business world that information is a resource that can be exploited to increase profitability and maintain competitiveness. This claim should be tested on the basis of sound business practice and judgement, where a great deal of good business sense is heuristic. But how is IM to be measured in relation to business performance? What are the indices and quotients applicable to information elements (intangible assets) which are value-added (realized or future) to an organization's operations? What is the equation between quantitative and qualitative variables which can be used to assess the worth of information in a business? Is it "willingness to pay for information", benefits accrued as a result of using technology, or are there other measurements?[3,21]

At present, current research indicates that there is no single unified theory of information which is able to separate information items and value them independently.[1] Indeed, it is suspected that no such management matrix of variables (matched and valued) could produce a single index (e.g. the Pareto Efficient Frontier or Data Envelopment [22]) meaningful to those who use them. To disprove this hypothesis, however, and to demonstrate the power of IM in a business context where success or failure is judged in terms of profit margins, increased efficiency, outwitting competitors etc, remains the challenge for IM.

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A comparison between the competencies deemed necessary for teacher-librarians in Iran and those suggested by librarians from developing countries

Dr A Jowkar
Shiraz University; Iran

The present survey attempts to investigate the viability of a single library education programme for the education of teacher-librarians in developing countries. Questionnaires were sent to 55 professional librarians in 29 different countries, of which 35 replies were received. Data were analysed and the result was compared with the outcome of a similar survey done for the education of teacher-librarians in the Islamic Republic of Iran. The overall view is that a single library programme for developing countries is possible.

The aim of this comparison has been to establish the viability of a single library education programme for the education of teacher-librarians in developing countries. To this end, an open-ended questionnaire was mailed to 55 library educators as well as practising school librarians in 29 different developing countries, of which 35 replies (63.6%) from 19 countries (65.5%) were received; however, one country and two answers, due to their unusability, were omitted. Table 1 shows the distribution of responses and the related countries, and Figure 1 also demonstrates the distribution of different classes of opinions on the competencies deemed necessary for the education of teacher-librarians in developing countries.

Some of the respondents, like Kalia[1] and Tikekar[2] believe that due to their practical experience, the attitudes, skills and knowledge of a school librarian who works in a school library, whether it be a developing country's school library or the "media centre" of a school in a developed country, would vary only in degree and not in type. Whilst such a claim is arguable, it is presumably based on this assumption that certain courses are necessary and generally adequate to carry out the entrusted duties. Certain courses are usually referred to as "core courses". These courses which are also being taught at education colleges, as Khandwala[3] and Tikekar[4] mention, include cataloguing and classification, reference services and library management. Of course, this view is not only of a librarian from a developing country, it is also shared by western librarians as well. Beswick argues that the school librarian should be well trained in the areas of selection of materials, reference and enquiry work, the organization of knowledge and the organization and management of the library[5]. In some colleges and universities, such as the Library and Information Studies Department of the University of Melbourne, more emphasis is placed on four subjects: literature, collection development, bibliographic organization and retrieval of information, and management[6].

However, the idea of a core curriculum has not been welcomed by others, for example Saunders, who believes that a "core" and professional education course for both developing and developed countries is not practicable. He writes that "it is surely very clear that library and information goals and objectives can often be very significantly different in the developing world from this, it would surely follow that professional education should likewise be different[7]. Hayes also thinks that the concept of "core" should be regarded within the context of the objectives of a particular institution and the community which it serves. He rejects any idea of a model core curriculum and believes that such a thing is impracticable even across the different institutions in the same country, 'Even in the US, there is indeed difficulty for the student who transfers from one institution to another, since there actually is little common agreement on what is the core requirement'[8]. In making a further distinction between the advanced and developing countries, Saunder's extensive experience in the developing countries, as he claims, has led him to believe that for developing countries 'everything is core'[9]. Despite this – to a great extent – valid statement, as the two studies complemented by this researcher show, some common ground can be found between a large number of developing countries, if not all of them. However, in the case where such a common educational ground can be found, the level needs of each individual country would differ and, thus, should be taken into account in any adopted common core curriculum.

The result of the study of Iranian practising school librarians seems to be largely similar to the outcome of views expressed in the survey of competencies deemed necessary by teacher-librarians in developing countries by this same researcher (Tables 2-4). A look at the results in the category of 'Knowledge' of both studies (Tables 2 & 5) shows that all competencies, with the exception of 'counselling psychology', which have been suggested by the respondents, are almost the same. The main difference is in the degree of necessity

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or level of emphasis expressed by the respondents which might partly be due to the number of participants in the two studies and partly due to the difference in the type of the two questionnaires. Competencies such as 'Acquisition and selection', 'Cataloguing and classification', 'Child and adolescent psychology', 'General reference sources and referral services', 'Children and young adults' literature' and 'School librarianship' are present among the first eight ranked order competencies in the two studies demonstrating undoubtedly the similarities of interest and needs for common competencies in the various developing countries. A similar observation might be made for the categories of 'Skills' and 'Attitudes' in both studies (Tables 3-7). The difference, in level and order of importance within the competencies of both studies, is also due to the economic conditions and technological advances made in each individual country.

As regards the economic power, technological advances and the level and quality of education, it is clear that countries like Sierra Leone, Kenya, Indonesia, India, Iceland, Malaysia, Hong Kong, and Taiwan are at different stages of development and, therefore, their needs and demands would certainly vary in degrees and levels. For instance, as tables of competencies of 'Skills' in both studies show, the need for the audiovisual materials to use or the operation of computers has been considered very low in both studies. The reason for giving such a very low value to these competencies is due, firstly, to the lack of such materials in the majority of school libraries and, secondly, economical and technological advances as well as the present needs of these countries to this equipment. Concerning the situation of school libraries in developing countries, Saunders wrote:

> How does one answer the objection that once was put to me in Kenya – that the concept of a resource centre with strong audiovisual emphasis is all very well, but what happens in the situation – the very normal situation – where there is no electricity available to run audiovisual hardware?[10].

'There are more urgent things that need to be done first,' writes one of the respondents from these developing countries, 'like the construction of schools throughout the nation ... before providing schools with a decent library and well-trained library staff'[11]. If compared to other developing countries, India is far ahead of many even advanced developing countries; however, 'About 60% of the schools', writes Kumar, 'do not have a qualified librarian' and 'almost half of the schools do not have a library worth the name. Primary and middle schools mostly fall under this category'[12].

Another similarity between the two studies is concerned with the category of "attitudes". Here, as in the case of Iranian practising librarians, the respondents have given the highest value to one of the competencies in the category of "Attitudes", reflecting their interest and eagerness in this type of competency. Like the school librarians in the British survey[13] and the Iranian practitioners in the Iranian study[14], the librarians from the surveyed developing countries gave the highest values to the category of "Attitudes" as well as to many suggested additional competencies in this area of competence, indicating the severe need for this type of competency in the education of teacher-librarians.

One important weakness, in this study of developing countries, lies in its limited coverage which consists of only 29 countries. However, to find and locate an adequate number of countries and qualified librarians who would be willing to participate in such a study proved to be next to impossible. Obviously further research in this area should be seen as a priority. However, if compared to a similar work which has been done at an international level, it seems to be more encouraging than it looks at the beginning! This international work is entitled *Guidelines for the education and training of school librarians*: IFLA Professional Report No. 9 and is compiled and edited by Sigrum Klara Hannesdottir, 1986. These guidelines are the outcome of the work of an international group of people undertaken over approximately three years which comprised 17 persons from 12 countries (Australia, Canada, Columbia, Costa Rica, The Gambia, West Germany, Iceland, Jamaica, Nigeria, Sweden, UK and USA) and based on 8 state-of-the-art reviews produced by the working group members, covering only parts of Europe; North, South, and Central America; Africa; and Australia. This joint work of an international group has no sample from the Middle and Far East countries as well as Asia where the most thickly populated part of the work is located.

In the light of the outcome of the survey and the above discussion, the overall view seems to be that a single library programme for the education of teacher-librarians is possible, with regard to the fact that in each of these developing countries there are specific needs and cultural characteristics that need to be met and taken into consideration. However, this survey should be looked upon as the first steps and the beginning of a single library programme for the education and training of teacher-librarians in all developing countries.

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TABLE NO. 1
DISTRIBUTION OF RESPONSES FROM DEVELOPING COUNTRIES POSITION

COLUMN	NAME OF COUNTRY	FREQUENCY	PROFESSOR AND HEAD OF LS DEPT	PROFESSOR OF LS DEPT.	ASSOCIATE PROFESSOR OF LS DEPT.	ASSISTANT PROFESSOR OF LS DEPT.	HEAD SENIOR & DIRECTOR OF LIBS.	OTHER
1	Brazil	2			*	*		
2	China	1		*				
3	Hong Kong						*	
4	India	6	* * *	*			*	Researcher *
5	Indonesia	1					*	
6	Kenya	2					*	Headteacher *
7	Kuwait	1				*		
8	Malaysia	3				*	* *	
9	Nigeria	2		*			*	
10	Pakistan	2			*		*	
11	Philippine	3	*			*	*	
12	Senegal	1				*		
13	Sierra Leone	1					*	
14	Singapore	2					*	Library Dir. * & curr Pnr
15	Taiwan	1			*			
16	Turkey	2		* *				
17	Iceland	1			*			
18	Venezuela	1				*		
Total		33	12.1	15.2	12.1	18.2	33.3	9.1

Figure no. 1 Opinions of professional educators and librarians from developing countries on competencies required by the teacher-librarians in developing countries

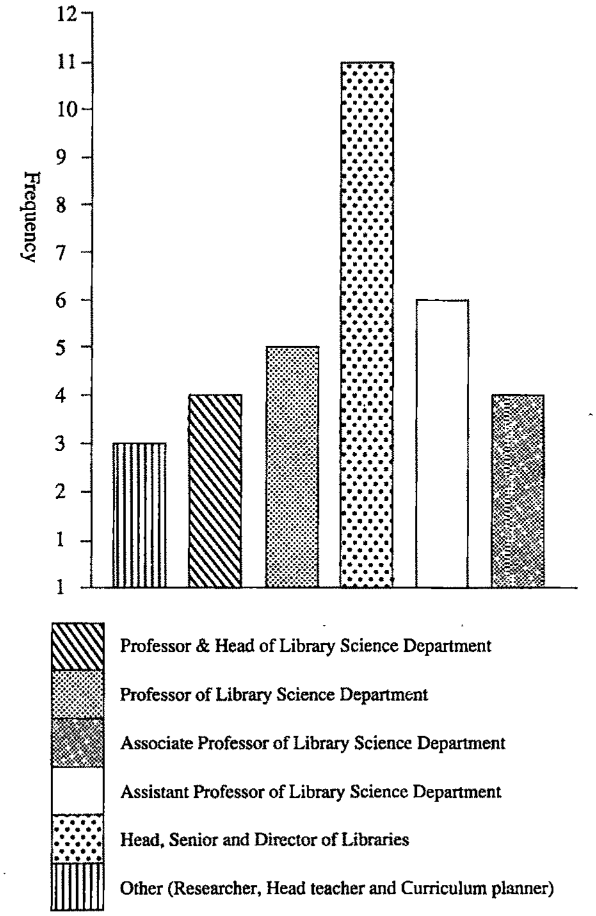

Table 2 Category of *knowledge*: competencies expressed as 'necessary' by the Librarians from developing countries in banked order

Col		Necessary	Desirable
1	Cataloguing and classification	19	2
2	Acquisition and selection	18	–
3	Library administration	18	–
4	Child and adolescent psychology	17	1
5	Curricular planning	16	–
6	General reference sources and referral services	15	1
7	Children and young adults' literature and related sources	14	1
8	School librarianship	12	–
9	Principles and philosophy of education	11	1
10	Elementary education	9	–
11	Introduction to librarianship	9	–
12	Learning theories	9	–
13	Educational psychology	8	–
14	General psychology	7	–
15	Developmental psychology	7	–
16	Personality psychology	3	1
17	Social psychology	3	–
18	Educational system	3	–
19	Educational administration	1	–
20	Counselling psychology	–	–

Table 3 Category of *skills*: competencies expressed as 'necessary' by the librarians from developing countries in ranked order

Col		Necessary	Desirable
1	Teaching library skills to students	18	–
2	Communication with other school libraries and outside information centres	14	1
3	Co-operation with teachers for the success of curricular programmes	15	–
4	Promotion of reading and studying	9	–
5	Library promotion	9	–
6	Library financial mangement	7	–
7	Helping and guiding students in locating information	6	–
8	Display of book exhibitions, etc.	5	1
9	Giving talks and speeches to students in the library to motivate them to read and develop study skills	4	–
10	Audio-visual equipment use	3	–
11	Computer use	3	1
12	Pastoral care of pupils in the library	2	–

Table 4 Category of *attitudes*: competencies expressed as 'necessary' or 'desirable' by the librarians from developing countries in ranked order

Col		Necessary	Desirable
1	Willingness to help and co-operate	21	–
2	Patience	9	–
3	Commitment	8	1/
4	Willingness to learn	8	–
5	Responsbility	8	1
6	Integrity	6	–
7	Dynamism	5	1
8	Conscientiousness	5	–
9	Flexibility	4	–
10	Postivity	4	–
11	Awareness of the workplace	4	1
12	Initiative	3	1
13	Consistence	3	–
14	Self-motivation	2	–
15	Realism	1	–
16	Prudence	1	–

Table 5 Category of *knowledge*: competencies ranked by combined values: cities of Bushire, Mashad and Shiras

1	Acquisition and Selection	92.9	VH
2	Cataloguing and Classification	90.1	VH
3	School Librarianship	87.2	VH
4	Educational Psychology	83.3	H
5	Child and adolescent psychology	82.6	H
6	General reference sources and referral services	82.1	H
7	Children and young adults "literature and related sources	80.4	H
8	Introduction to librarianship	76.6	H
9	General psychology	75.8	H
10	Personality psychology	75.3	H
11	Social psychology	73.4	M
12	Counselling psychology	70.8	M
13	Educational systems	69.6	M
14	Developmental psychology	68.4	M
15	Principles and philosophy of education	67.6	M
16	Learning theories	63.7	M
17	Library administration	56.8	L
18	Elementary education	55	L
19	Curricular planning	51.6	L
20	Educational administration	45.1	L

VH = very high, H = high, M = moderate, L = low, K = knowledge
x = the mean of the distribution, σ = the standard deviation of the distribution,
$x = 72.3$, $\sigma_k = 12.7$

Table 6 Category of *skills*: competencies ranked by combined values: cities of Busher, Mashad and Shiraz

1	Promotion of reading and studying	96.9	VH
2	Library promotion	94.2	H
3	Teaching library skills to students	93	H
4	Pastoral care of pupils in the library	90.2	H
5	Helping and guiding students in locating information	88	H
6	Display of book exhibitors, etc.	85.6	H
7	Co-operation with teachers for the success of curricular programmes	78.6	H
8	Audio-visual equipment use	75.8	M
9	Communication with other school libraries and other outside information centres	75.5	M
10	Giving talks and speeches to students in the library to motivate them to read and develop their study skills	69.2	M
11	Library financial management	61.6	L
12	Computer use	34.9	L

VH = very high, H = high, M = moderate, L = low, S = skills
x = the mean of the distribution, σ = the standard deviation of the distribution,
$x_s = 78.6$ $\sigma_s = 16.7$

Table 7 Category of *attitude*: competencies ranked by combined values: Cities of Busher, Mashad and Shiraz

1	Integrity	96.9	VH
2	Dynamism	96.9	VH
3	Commitment	95.5	H
4	Conscientiousness	95.4	H
5	Responsibility	94.1	H
6	Patience	93.3	H
7	Initiative	92.5	H
8	Realism	92.3	H
9	Willingness to learn	91.9	H
10	Awareness of the workplace	91	M
11	Prudence	89.8	M
12	Consistence	89.6	M
13	Willingness to help and co-operate	89.3	M
14	Positivity	89.3	M
15	Self-motivation	89.1	M
16	Flexibility	89.1	M

VH = very high, H = High, M = moderate, L = low, A = attitudes
x = the mean of the distribution, σ = the standard deviation of the distribution,
$x_x = 91.7$
$\sigma_x = 4.1$

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The foreign language barrier in information transfer at the University of Tasmania

Christopher Riley
University of Tasmania

Abstract

A survey of indexing and abstracting tools held at the University of Tasmania's library was conducted to determine the amount of foreign language materials available to researchers working at the University. The research workers themselves were also surveyed in order to ascertain the effects of the foreign language barrier on their ability to access information relevant to their fields of study. The data suggests that there is a considerable barrier which adversely affects information dissemination and that there exists a need for the development of library services especially designed to confront this barrier.

Introduction

Of the approximately 3000 languages spoken throughout the world only nineteen have more than fifty million speakers. These are (listed according to speaker population) Chinese (825m.), English (431m.), Hindi (325m.), Spanish (320m.), Russian (289m.), Arabic (187m.), Portuguese (169m.), Malay-Indonesian (135m.), Japanese (123m.), German (118m.), French (117m.), Urdu (8m.), Korean (68m.), Telegu (65m.), Tamil (63m.), Italian (63m.), Javanese (55m.), Vietnamese (54m.) and Turkish (53m.) (World Almanac, 1989: 224-225). Some of these languages such as English and Spanish are spoken in several countries and are spoken by many more as a second language. Others are spoken in only one country and their usage is very much confined to that country.

However, by comparing these figures with the number of books published in a given language in a year it is clear that the number of speakers is not a true reflection of the amount of printed information available in that language. Of the approximately 550,000 titles published worldwide in 1986, only thirteen countries produced more that 10,000 works each. They were:

English – more than 140,000
Russian and German – more than 80,000
Spanish – more than 70,000
Japanese – more than 40,000
French and Korean – more that 35,000
Dutch and Italian – more than 10,000
Czech, Hungarian, Polish and Swedish – approximately 10,000 each

(*UNESCO Statistical Yearbook*, 1987: Section 7.9)

Chinese, with 825 million speakers, does not appear at all while other languages such as Swedish, with only 9 million speakers, produced approximately 10,000 titles. Although these figures are not restricted to academic resources, they do give some idea of the languages which the researcher is likely to confront in search of information. Not all research workers will be able to understand all the languages in which information is made available in their particular fields of study and sooner or later the foreign language barrier will disrupt the process of information transfer.

The term 'foreign language barrier' is used to describe the situation in which the process of communication is broken due to the existence of a language not intelligible to all people involved in that process. In the area of research this can be most detrimental as the foreign language barrier effectively renders useless all study undertaken and published in a language foreign to the information seeker. Scientists in the United States, for example, might not know that Soviet studies in their fields of research have been done and the results published, because they are obscured from their view by a language which they cannot understand.

In order to overcome the problems posed by the foreign language barrier, the way in which it manifests itself and the extent to which it affects research must be established. The main aim of this study is to determine the extent to which information transfer within the research community at the University of Tasmania is affected by the foreign language barrier. This aim can be broken down into the following objectives:

1 – To determine the amount of foreign language material available to researchers at the University of Tasmania,
2 – To assess the foreign language proficiency of research workers,
3 – To investigate problems caused by the foreign lanugage barrier and how researchers attempt to overcome them,

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4 – To review the role of the university library in providing effective access to foreign language resources.

Review of the literature

The literature dealing with the foreign language barrier as it manifests itself in the research environment spans the past four decades. One of the early papers concerned with the problem provides an excellent introduction to the phenomenon (Holmstrom, 1962). Although Holmstrom's article is not based upon research in the field, it nevertheless gives an authoritative outline of the difficulties that arise when the researcher is confronted with potentially valuable information in a language he or she cannot understand. Librarians were, however, already well aware of the language barrier and studies into its effects upon specific fields of research had already been undertaken, such as Hanson's report on the barrier in science and technology (Hanson, 1962). The trend of concentrating the study of the phenomenon in one or two distinct areas of research appears to have continued (e.g. Wood, 1967; Saunders, 1972; Chan, 1976; Thorp, 1988). These are very good in that they provide a detailed analysis of that particular area of research and the problems that foreign language material poses in it. For example, scientists rely heavily on journal articles, and as 50% of the information published in the field appears in a foreign language, problems will naturally occur in information transfer (Wood, 1967; Chang, 1976). Other studies have approached the topic from a more general standpoint, reviewing the overall effects of the language barrier on research at one particular institution or a wider cross-section of the research community (e.g. Hutchins, 1971; Wood, 1974; Ellen, 1979).

Regardless of the perspective taken, the studies made have clearly shown that a barrier between information available and the researcher does exist due to the foreign language nature of that information.

There are, however, indications that the barrier is becoming smaller with the increase of materials published in English. For example, in 1967 Wood claimed that 51% of entries in *Index Medicus* referred to English sources whereas Ellen gives the figure of 76% in 1979 (Guha, 1985: 12; Ellen, 1979: 32). Over a similar period, the language proficiency of researchers appears to have decreased. In 1967, for example, 66.5% of scientists in the United Kingdom were capable of dealing with material in German (Wood, 1967: 122). By 1979 this figure had dropped to 47% (Ellen, 1979: 33). In a study undertaken in France in 1982, it was claimed that 97% of German scientists can read English (Michel, 1982: 132). Nevertheless, Ellen says that 76% of people surveyed had recently experienced problems with foreign language materials (Ellen, 1979: 35). The actual amount of foreign language resources indexed may have dropped, but a considerable amount of potentially valuable information is still not being effectively accessed because of the language barrier.

Guha points out problems concerning developing countries, claiming that at the moment they are restricted by the foreign language barrier and that any research undertaken in these countries will only be of limited use to its people if researchers choose one of the more dominant world languages as their medium of expression (Guha, 1985: 36).

All the literature has suggested translations as the most viable solution to the problem. This includes an improvement in the provision of English abstracts of foreign research (Hutchins, 1971; Saunders, 1972; Chan, 1976 among others). After consulting an English summary of the material concerned, the researcher can estimate its value and then proceed with a search for a full translation in indexes to translations. Hutchins notes that 91.2% of the university researchers he interviewed never used translation indexes, and 12.6% of that number did not know they existed (Hutchins, 1971: 19). This need for greater awareness of the indexing services available among researchers and librarians is highlighted in many studies (Wood, 1967; Hutchins, 1971: Saunders, 1972; Chan, 1976, 1977; Thorp, 1988). This problem has obviously existed for some time and has not yet been overcome.

The process of commissioning a translation is also raised by virtually all who have studied the problem of the foreign language barrier. As early as 1962 Holmstrom advocated cover-to-cover translations of important journals. This has been achieved to a certain extent, especially with Russian scientific material, but is very expensive and not always of the highest possible standard (ITI2, 1988: 92). The majority of translations are of single articles. In the 1960s Holmstrom (1962) and Hanson (1967) expressed the hope that the development of machine translations would alleviate the costly process of employing professional translators. By 1976 it was thought that translations produced by trained personnel could not be replaced and that the role of translating machines would remain very limited (Chan, 1976). Development is still, however, continuing in this area.

In the papers consulted, attention is repeatedly drawn to the librarian's role in helping others to overcome the language barrier (Wood, 1967; Hutchins, 1971; Saunders, 1972; Chan,; 1976; Thorp, 1988). The library should work towards an increase in the awareness of abstracting and indexing tools as well as holding information on, co-ordinating or establishing translation services within the community it serves.

It must be noted that the majority of the studies in this area have been British and no original Australian research on the topic could be found. The only Australian source found was a review of Hutchins' 1971 study (Jenkin, 1972), which suggested that the situation in Australia does not differ from that in the United Kingdom. Jenkin blames the situation on the drop in numbers of people studying foreign languages in Australia and the tendency to specialize in one subject area throughout tertiary education. These comments are, however, not supported by research.

Methodology

In order to assess the amount of foreign language information resources available to researchers at the University of Tasmania, a survey of the most important indexing and abstracting tools in each subject area was completed. From each of the following a count of foreign language references was made:

Bibliography and Index of Geology
Biological Abstracts
Chemical Abstracts
Computer Abstracts
Current Index to Journals in Education
The Engineering Index Monthly
Geographical Abstracts
Historical Abstracts
Index Medicus
International Bibliography of the Social Sciences – Economics
International Political Science Abstracts
L'Annee Philogique
LISA
Mathematical Review
MLA Bibliography
Philosopher's Index
Physics Abstracts
Psychological Abstracts
Sociological Abstracts

Due to the considerable size of these works this survey of foreign language content was restricted to a systematic sample of three hundred entries. The total number of entries for the year was divided by three hundred in order to obtain the sampling interval. In two cases, namely *Index Medicus* and *Philospher's Index* entries were not numbered and a count from ten randomly selected pages was taken to determine the average number of entries on each page. This average was then multiplied by the total number of pages containing entries. The 1988 edition of each of these indexes was used throughout, except for *International Bibliography of the Social Sciences – Economics.* This is the only international-multilingual index in the field available, at the University, but is no longer received. The 1983 edition, the latest available, was therefore used for the count. There are two major Law indexes: *Index to Legal Periodicals* and *Index to Foreign Legal Periodicals.* The former contains only English-language entries and the second only references to foreign journals. Therefore, no count was made for foreign language material. The fact that a separate index for foreign materials is produced indicates the importance of foreign language resources in the field. For the subject areas of English and Modern Languages the count was performed using the *MLA Bibliography.* In order to obtain a true reflection of the language nature of the information available in these fields a sample of three hundred was taken from the English-language literature sections and another from the French, German, Italian and Japanese sections. The same procedure of determining the sample was maintained.

In order to investigate the effects of the foreign language barrier on researchers a survey was undertaken in the form of a questionnaire distributed though the mail. The questionnaire was aimed at staff engaged in research at the University and therefore the sample population consisted of two groups; academic staff and research assistants/associates. A systematic sample of 150 research workers was taken from staff lists in each faculty handbook. These lists were used because access to more current lists was not available. The sample of researchers in each subject area was proportionate to the total number of researchers. Having calculated the samples in this way, the total sample population numbered 123.

The questonnaire consisted of one unstructured and eleven structured questions. Questions one to four and seven were designed to assess the dependent variables of status, age, foreign language proficiency and awareness of translation indexes. The remaining questions investigated the independent variables, enquiring whether or not respondents have, within the last twelve months, come across material in a foreign language which they would have liked to have read but were unable to do so due to the foreign language barrier. If so, they were asked to state the language(s) concerned, when this happened and what steps were taken to overcome the language problem. The population was also asked if they believe that they are being prevented from obtaining information relevant to their discipline because of the language barrier, and what improvements in or additions to the services provided by the University Library should be made in order to assist them in obtaining the information concerned.

The data collected from the questionnaire was analysed using the StatView statistics package. This enabled variables to be examined individually and in comparison to others.

Scope and limitations of the study

Because the finance and time available to perform this study were very restricted the scope had to be strictly limited. Ideally, all researchers at the University should have been surveyed to exactly define the nature of the foreign language barrier in this particular research environment. This could not be done, although the results from the sample population provide a reliable insight into the situation.

The survey of foreign language references in indexing and abstracting tools does not claim to account for all non-English material available. In all cases, only tools with international and multilingual coverage were chosen, but no attempt was made to count all foreign language entries. The results gained from the sample provide only an estimate of foreign language content. Not all indexing and abstracting tools could be surveyed and therefore one was chosen to represent each subject area in consultation with reference librarians.

No replies to the questionnaire were received from the School of Art or the Conservatorium of Music and therefore indexes in this field were excluded from the count.

Results

Explanatory note

In the following report of results, the subject area details given in the questionnaire have been grouped into six categories. These are:

1. Humanities,
2. Social Sciences, including Education and Librarianship,
3. Sciences,
4. Engineering and Computer Science,
5. Law, and
6. Medicine.

The results of the survey of abstracting and indexing tools have been grouped in the same way.

Returns

123 questionnaires were posted and 79 returns received. Five of these were returned unanswered for various reasons, leaving 74 completed questionnaires. The response rate was therefore 60.16%. The breakdown of respondents into subject area is as follows:

Humanities	17.6%
Social Sciences	25.7%
Sciences	27.0%
Engineering and Computer Science	10.8%
Law	5.4%
Medicine	10.8%
Subject Area Not Given	2.7%
Total	100.0%

91.89% were academic staff and 8.1% research assistants/associates.

Section One

Language distribution in abstracting and indexing tools

The most practical method of gaining some idea of the distribution of languages in academic publications is to examine the language content of abstracting and indexing tools. Table 1 outlines the language content of the major abstracting and indexing periodicals available at the University of Tasmania according to subject area.

It is clear that in all cases English is by far the most common language. French, German and Russian are the most common foreign languages in all areas, although in some disciplines minor languages also appeared frequently. For example, Czech was the third most common language in *LISA* (4%) and Polish was the third most common foreign language in *Historical Abstracts* (4.6%). Having compared these results with those from similar surveys performed by Wood in 1967 and Ellen in 1979 it appears that the percentage of English entries is growing. In 1967, 54% of entries in *Mathematical Review*, for example, were in English; in 1979 this figure had grown to 65% and in the survey completed for this study it was found that 74% of entries were in English (Guha, 1985: 12; Ellen, 1979: 32). Nevertheless, the proportion of entries not in English is still considerable with only the Engineering and Computer Science category scoring below 10%.

Although these figures give an approximation of the amount of foreign language material available to researchers at the University of Tasmania they are by no means a true reflection of the actual amount of resources published in languages other than English. Those indexing and abstracting tools published in English speaking countries display a bias towards English-language resources and do not make any claim to cover all relevant material published worldwide. Thus, the coverage of non-English resources is very select. It is interesting to note that no Japanese language entries were found in the Japanese section of *MLA Bibliography*, for example.

The information available to research workers at the University is, however, not restricted to those items listed in indexing and abstracting tools. Online databases also offer a similar service and for some of these, estimates have been made of the number of foreign-language items listed. In some cases the estimates given match those derived from the survey. For example, approximately 70% of records on *LISA* are in English, which corresponds to the 72% estimate taken from the survey.

Section two

Foreign language proficiency

In table 2 it can be seen that French is the most commonly understood language, followed by German. This is not surprising considering the fact that both of these languages have traditionally been taught in schools. Russian and Japanese both gained low scores and a number of other languages were listed with varying degrees of proficiency. The sample population was asked to identify languages in which they can read literature in their subject area. Some very obscure languages were mentioned, such as Pidgin, but there is no way of determining whether or not the people concerned actually use those languages for research purposes.

Overall, researchers in the Humanities had the highest level of foreign language proficiency with 61% of respondents being fluent in at least one foreign language. The Humanities also differed from other areas in the number of languages spoken by individuals. In the Sciences the proportion of people able to speak a foreign language fluently was much lower (10%), but 75% had some degree of foreign language literacy.

In the Social Sciences 10.5% were fluent in a foreign language, but 42% had no foreign literacy skills at all. Of the 75% of workers in Engineering and Computer Science who claimed some degree of foreign language knowledge only 12.5% were fluent. All respondents from Medicine indicated that they had foreign language skills, with 37.5% claiming fluency. Scores from Law were by far the lowest with only 25% able to read a foreign language and this only with considerable use of a dictionary.

It appears that foreign language proficiency differs with age. Of those aged between 26 and 50 years, 69% had some degree of foreign language proficiency whereas 90% of those aged above 50 years claimed to possess foreign language skills. This was also shown in Ellen's study in 1979 and she suggested that either not as many people are learning foreign languages as in the past or that researchers tend to gain foreign language skills as they grow older (Ellen, 1979: 32-33). This may also be a result of subject specialization as early as HSC level studies and certainly at the tertiary level.

Section three

The foreign language problem

In attempting to gauge the extent of the problems caused by the language barrier the two most important factors to be considered are the foreign language skills of the people experiencing the problem and the amount of foreign language documents in their field. One factor that cannot be measured is the amount of literature simply ignored because it is written in a foreign language. This may happen for a number of reasons, including an information overload which leads the researcher to automatically ignore all resources written in a language not understood by him or her in order to bring the materials available down to a manageable size, not being aware of the existence or value of work done in non-English speaking research environments, or simply disregarding all foreign language items as a matter of course. It cannot, however, be automatically assumed that those respondents who have indicated having language problems with certain documents felt that the information contained within them would be important to their field of study.

In Table Four the levels of foreign language proficiency in each subject area are compared with the foreign language content of journals in the area. In all languages except Russian and Japanese the percentage of foreign language speakers compares favourably to the percentages of foreign language materials available. These figures paint a distorted picture to a certain degree. It cannot be assumed that because 10% of scientists can understand Russian in which 7.8% of potential information resources are written that no language problems will occur. On the other hand, these figures indicate that within a particular subject area substantial language skills are present.

Problems experienced in the past twelve months

36.5% of the sample population stated that they had experienced problems with foreign language materials within the last twelve months. Some researchers had experienced difficulties with more than one language. The Table Five outlines the languages which caused problems to research workers.

The 'other' category comprises Chinese, with two cases, and Spanish, Finnish and Czech all recording one occurrence.

It was expected that Japanese would occur more frequently than French or German, which both scored high proficiency levels. Of the 27 who had foreign language problems, 18 claimed some degree of foreign language knowledge. Six of the 27 claimed to be able to read materials in the language with which problems were experienced. This included one researcher who indicated fluency in French but was unable to understand a document in French.

Table Six shows the distribution of language problems according to subject area. Science researchers faced the most problems although only 16.7% of journal articles were found to be written in a language other than English and foreign language proficiency was high (75%). The results from the Social Sciences and Law correspond to the low level of foreign language skills of workers in those areas. In the Humanities, with a language proficiency level of 100%, no problems were experienced.

Table 7 outlines the languages which caused problems in the last twelve months and the subject areas in which they appeared. German and French papers caused problems in all areas except the Humanities and Law. Russian led to the most difficulties in the Sciences, although 22.2% of the problems experienced in the Social Sciences were also caused by Russian. The obvious importance of Russian language information sources has not been met with sufficient language skills. Problems with Japanese were confined to the Sciences.

Section Four

Action taken to overcome the foreign language barrier

In commenting on the action taken by researchers to overcome the language barrier three points must be kept in mind. The steps taken will reflect the value placed on the document in question by the researcher, the availability of facilities and his or her awareness of those facilities.

In Table Eight the action taken according to the language of the problem document is shown. The most common action taken overall was to search for an English language summary or abstract. In comparison to other possible steps, this was done more frequently when confronted by a paper in Japanese or Russian. This reflects the low level of proficiency in these two languages. The numbers of researchers who attempted to locate an existing translation was surprisingly low for all languages other than French. In all languages apart from Japanese a considerable percentage took no action at all. This was the case for 22.2% of French papers, 22.2% of German papers, 12.5% of Russian papers and 40% of papers from the 'other' category. The fact that some action was taken for all Japanese documents and that only 12.5% of Russian documents were not acted upon suggests that a relatively high value is placed on Russian and Japanese research.

It is interesting to note that although 72% of research workers claimed to possess some level of understanding of French, no researchers approached their colleagues to at least outline the contents of the document concerned, with 22.2% preferring to take no action at all. Also regardless of the relatively high French proficiency rate, no researchers attempted to translate the paper themselves. A similar situation appears with German. 46% of the sample population claimed some level of German comprehension but only 11.1% attempted to translate the problem document themselves. Ellen also found this in her study and felt this showed that increasing foreign language knowledge would not alleviate the situation because of the considerable amount of time necessary to read a document in a language in which the reader is not fluent (Ellen, 1979: 35-35). However, by raising the standards of foreign language proficiency, most researchers would at least be better able to gauge the value of a non-English paper than if they had no language skills at all.

Table 9 gives the action taken by research workers according to subject area. Workers in the Social Sciences searched for an existing translation more than people in other areas. Researchers in the Social Sciences, Sciences and Engineering and Computer Science categories all relied heavily on English language summaries or abstracts. Having a colleague outline the contents appears to only occur in the Sciences and Social Sciences where it is frequently done (25% and 28.6% respectively). Researchers in medicine most frequently took no action at all. In fact, 100% of respondents who had language difficulties took no action. Only one case occurred of a researcher – in the Social Sciences – having a translation prepared within the University, and two cases – one in the Social Sciences and one in the Sciences – of having a translation prepared by an outside organization.

Section Five

Are researchers missing out on valuable information?

The sample population was asked whether or not they considered that they are missing out on valuable information in their subject area due to the foreign language barrier. 39.7% believed that they were disadvantaged by the barrier and 63% considered that they had access to all the necessary information. Of those who faced language problems within the last twelve months, 73.1% believed they were missing out on valuable information and 26.9% did not. 10% who did not encounter language problems within the last twelve months still believed that they were not accessing important resources in their field. 78% neither had a foreign language problem nor thought they were lacking valuable resources due to the foreign language barrier. 75% of researchers in the Engineering and Computer Science area felt they were missing out compared with 60% in the Sciences and 50% in the Social Sciences. No research workers in Medicine believed they were at a disadvantage and in the Humanities, where all respondents claimed some degree of foreign language ability and no language problems were recorded, 15.38% nevertheless thought they were not accessing all relevant materials. However, the level of awareness of, and value given to, foreign language resources may rise with the language skills of the researcher. This does not, however, appear to be the case with Medicine where foreign language proficiency also reached 100%.

Section six

Awareness of indexes to translations

Only 14.9% of respondents were aware of translation indexes. Researchers in the Humanities were most aware, with 30.77% claiming to know translation indexes exist whereas none of the respondents from Law knew of them. In Ellen's study only 11% of scientists were aware of *World Transindex* (Ellen, 1979: 37). In this survey this figure had dropped to 10%.

Of those who were aware of translation indexes only 36.36% actually consulted them. Among the 63.63% who were aware of them but made no use of them, only one had faced a foreign language problem within the last twelve months. No action was taken to overcome the language barrier in this case. 30% of index users were from the Sciences, 25% from the Social Sciences and 25% did not give subject area details. Only one of those who claimed that they make use of translation indexes actually did so when faced with a foreign language document that could not be understood. Four others stated that they searched for an existing translation when asked what action they took to overcome the language barrier although they also claimed they did not use translation indexes. One of those four was not aware that translation indexes are available. This must mean that they relied on someone else, most probably a librarian, to search the indexes for them.

Section seven

General comments given in question eight

The final question asked what library services respondents would like to see introduced or improved to help overcome the difficulties caused by foreign language material. 54.1% of respondents answered this question. Only one person – for the Humanities – said they were satisfied with the current services offered by the university library. It must be noted, however, that this person had an unusually high level of foreign language proficiency and claimed not to have experienced any foreign language problems.

25% of respondents called for more information to be supplied by the University Library on the services it offers. It was felt by those who had had problems that their difficulties would be alleviated if they were aware of library services. Others commented that if they knew of the library services they would be encouraged to use more foreign language material instead of viewing it as a potential source of problems and therefore ignoring it. No suggestions were made, however, on how awareness could be raised by the library.

A translation service either run or co-ordinated by the library was suggested by 22.5% of those commenting. Expense was recognized as an important factor here and one respondent mentioned a user-pay based service. Some suggested that the library should merely be able to inform users of who is available to translate material on campus. 10% put forward that accessibility and availability of existing translations be improved.

An improvement in abstracting tools was mentioned by 10% of respondents, stressing the need for high quality abstracts for non-English materials. One respondent suggested that abstracts should be done away with completely as they are too vague and therefore of little value.

Improvements in access to online databases was suggested by 5% of respondents, although they failed to mention how this would help overcome the foreign language barrier. Another 5% suggested that no services should be introduced, and that more money should be spent on obtaining English-language materials. One person even suggested that the problems posed by the foreign language barrier are far too large for a library to cope with. Bilingualism among library staff was mentioned by 5% of those commenting.

Some respondents took this opportunity to make general comments about the foreign language barrier in their subject areas. Research workers in Education and Computer Science noted that most research in these fields is published in English, regardless of its country of origin. This was also noted when estimating the foreign language content of indexing and abstracting tools, especially in the areas of Computer Science and the Sciences. Another respondent noted that a considerable amount of reference material for Chemistry is published in German, eg. the Beilstein series. It was observed when performing the survey of indexing and abstracting tools that translations of Russian science journals were common, with each entry giving details of the original Russian source and that most Japanese research is published in English. These observations were supported by comments made by scientists in question eight.

Current university library services

The library's efforts to assist users of foreign language materials are based on three bibliographic resources. These are *Index Translatorium*, and *World Transindex*, which encompasses the now obsolete *World Index of Scientific Translations*, and up-to-date directories of translators from the National Accreditation Authority for Translators and Interpreters (NAATI). *World Transindex* is also available online and is used more frequently than the hard copy. NAATI directories give details of local translators to whom the library can direct enquirers. A small file of professional translation services is also kept. Thus, if an existing translation cannot be found in one of the indexes, people faced with foreign language problems can only be directed to a professional translator. When dealing with a document in a language taught at the University, the appropriate department is often contacted in the hope that a member of the academic staff may be able to assist. However, no attempt has been made to compile a list of people at the University willing to translate foreign language material.

The level of service, apart from consulting the resources mentioned above, is likely to depend on the librarian's own foreign language skills or awareness of the foreign language barrier. Brief and informal interviews were held with three reference librarians to investigate this hypothesis and it was found that all avenues would eventually be explored, although the librarian's own knowledge of the language concerned does affect the way he or she goes about assisting the library user. All three librarians interviewed considered foreign language knowledge an important and useful skill in all areas of reference work.

Conclusion

The results from both the survey of indexing and abstracting tools and that of researchers indicate that information at the University of Tasmania is adversely affected by the foreign language barrier.

From the results of the survey of indexing and abstracting tools it can be concluded that a substantial amount of foreign language resources are available. The survey of research workers revealed that, with the exception of French and to a lesser extent German, researchers at the University are generally unable to deal with these foreign language materials. The inability to read documents in languages other than English is an obvious source of difficulties, but the main cause of the problems experienced with foreign language materials does not appear to be wholly due to a lack of foreign language skills among researchers.

The questionnaire clearly showed that development of services specifically designed to assist researchers access foreign language resources are needed. The library must increase awareness of translation indexes and act as an effective interface between researchers and translation sources. The effect of developing an effective support service would be twofold. Firstly, those research workers who already attempt to make use of foreign language resources will be able to do so more efficiently and, secondly, others who have ignored foreign language materials as a matter of course might be more encouraged to use them in the future.

If the present situation is not changed researchers will continue, in many cases without knowing it, to be disadvantaged by the language barrier and not realize the full potential of the resources available to them.

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	French %	German %	Russian %	Japanese %	Other %	Total %
Humanities	9.2	11.2	0.8	0.07	14.9	36.1
Soc. Sci.	7.1	6	2.8	0.3	7.9	24.3
Sciences	2	2.1	7.8	1.5	3.3	16.7
Engineering	0.8	3.5	1	0.5	1.1	7
Medicine	3.7	3.7	5.7	4.7	7.7	25

Table 1 Language content of indexing and abstracting tools according to subject area

	fluent %	occasional use of dictionary %	frequent use of dictionary %	unable to read %	total %
French	16.2	29.7	25.7	28.4	100
German	5.4	18.9	21.6	54.1	100
Russian	0	1.4	4	94.6	100
Japanese	2.7	0	0	97.3	100
Other	6.6	10.8	5.4	77.2	100

Table 2 Foreign Language Proficiency

		Humanit.	Soc. Sci.	Sciences	Engin.	Law	Med.
FRENCH	fluent	46.1%	0%	6.7%	12.5%	0%	37.5%
	occ. use of dict.	30.8%	31.6%	20%	37.5%	0%	37.5%
	freq. us of dict.	15.4%	15.8%	23.3%	25%	25%	25%
	none	7.7%	52.6%	50%	25%	75%	0%
GERMAN	fluent	15.4%	5.3%	3.3%	0%	0%	0%
	occ. use of dict.	15.4%	10.5%	10%	12.5%	0%	75%
	freq. use of dict.	38.5%	5.3%	20%	37.5%	0%	0%
	none	30.8%	78.9%	66.7%	50%	100%	25%
RUSSIAN	fluent	0%	0%	0%	0%	0%	0%
	occ. use of dict.	0%	5.3%	0%	0%	0%	0%
	freq. use of dict.	0%	0%	10%	0%	0%	0%
	none	100%	94.7%	90%	100%	100%	100%
JAPANESE	fluent	15.5%	0%	0%	0%	0%	0%
	occ. use of dict.	0%	0%	0%	0%	0%	0%
	freq. use of dict.	0%	0%	0%	0%	0%	0%
	none	84.5%	100%	100%	100%	100%	100%
OTHER	fluent	15.4%	10.5%	0%	12.5%	0%	0%
	occ. use of dict.	15.4%	5.3%	6.7%	12.5%	0%	25%
	freq. us of dict.	7.7%	0%	3.3%	12.5%	0%	0%
	none	61.5%	84.2%	90%	62.5%	100%	75%

Table 3 Details Of Foreign Language Proficiency According to Subject Area

Subject area	Foreign lang. content in journals / Foreign lang proficiency	French	German	Russian	Japanese	Other	Total
	Humanit.	9.2% 92.3%	11.2% 69.2%	.8% 0%	.0.7% 15.4%	14.9% 38.5%	36.1% 100%
	Soc. Sci.	7.1% 47.7%	6% 21.1%	2.8% 5.3%	.3% 0%	7.9% 15.7%	24.3% 58%
	Sciences	2% 50%	2.1% 33.3%	7.8% 10%	1.5% 0%	3.3% 10%	16.7% 75%
	Engin.	.8% 75%	3.5% 50%	1% 0%	.5% 0%	1.1% 37.5%	7% 75%
	Med.	3.7% 100%	3.7% 75%	5.7% 0%	4.7% 0%	7.7% 25%	25.3% 100%

Table 4 A Comparison of Foreign Language Proficiency Levels with Foreign Language Content of Journals

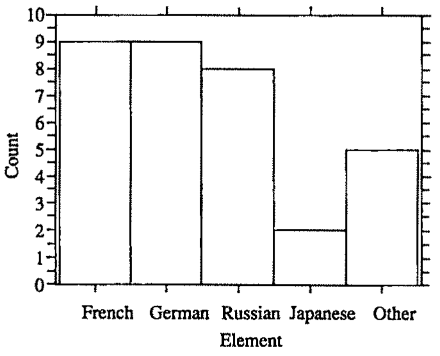

Table 5 Language Which Caused Problems Within the Last 12 Months

	Yes %	No %
Humanities	0	27.66
Soc. Sci.	28	25.53
Sciences	48	17.02
Engineering	8	12.77
Law	12	2.13
Med.	4	14.89
Totals	100	100

Table 6 Distribution of language problems according to subject area

	French %	German %	Russian %	Japanese %	Other %	Totals %
Humanities	0	0	0	0	0	0
Soc. Sci.	44.5	22.2	22.2	0	11.1	100
Sciences	14.3	21.4	28.6	14.3	21.4	100
Engineering	25	75	0	0	0	100
Law	33.3	33.3	33.3	0	0	100
Medicine	0	0	0	0	100	100

Table 7 The Language of Problem Documents and the Subject Areas in which they Appeared

Percents of Column Totals

	French	German	Russian	Japanese	Other	Totals:
A	33.33%	11.11%	12.5%	0%	0%	15.15%
B	33.33%	22.22%	50%	100%	0%	33.33%
C	0%	22.22%	25%	0%	20%	15.15%
D	0%	11.11%	0%	0%	20%	6.06%
E	0%	11.11%	0%	0%	0%	3.03%
F	0%	0%	0%	0%	20%	3.03%
G	22.22%	22.22%	12.5%	0%	40%	21.21%
H	11.11%	0%	0%	0%	0%	3.03%
Totals:	100%	100%	100%	100%	100%	100%

A = Tried to locate an existing translation
B = Looked for an English language summary or abstract
C = Had a colleague outline the contents
D = Attempted to translate it wholly or partly yourself
E = Had a translation prepared within the University
F = Had a translation prepared by an outside organisation
G = Took no action
H = Other (please state)

Table 8 Action taken according to problem language

	A %	B %	C %	D %	E %	F %	G %	H %	Totals %
Humanities	0	0	0	0	0	0	0	0	100
Soc. Sci.	16.7	33.3	25	0	8.3	8.3	8.3	0	100
Sciences	7.1	35.7	28.6	7.1	0	7.1	14.3	7.1	100
Engineering	0	50	0	50	0	0	0	0	100
Law	20	20	0	20	0	0	40	0	100
Med.	0	0	0	0	0	0	100	0	100

A = Tried to locate an existing translation
B = Looked for an English language summary or abstract
C = Had a colleague outline the contents
D = Attempted to translate it wholly or partly yourself
E = Had a translation prepared within the University
F = Had a translation prepared by an outside organisation
G = Took no action
H = Other

Table 9 Action Taken According to Subject Area

Percents of Row Totals

	Yes	No	Totals:
Yes	73.08%	26.92%	100%
No	21.28%	78.72%	100%
Totals:	39.73%	60.27%	100%

Table 10 'Missing Out on Information?' Compared with 'Experienced Language Problem?'

Percents of Row Totals

	Yes	No	Totals:
Humanities	15.38%	84.62%	100%
Soc. Science	50%	50%	100%
Sciences	60%	40%	100%
Engineering	25%	75%	100%
Law	75%	25%	100%
Medicine	0%	100%	100%
Totals:	39.44%	60.56%	100%

Table 11 Missing Out? According to Subject Area

Percents of Row Totals

	Yes	No	Totals:
Humanities	30.77%	69.23%	100%
Soc. Science	10.53%	89.47%	100%
Sciences	10%	90%	100%
Engineering	12.5%	87.5%	100%
Law	0%	100%	100%
Medicine	12.5%	87.5%	100%
Totals:	13.89%	86.11%	100%

Table 12 Awareness of Translation Indexes According to Subject Area

A retail opportunity in the contemporary information market

Dr AE Jackson,
Tailored Information Ltd.

Information has been needed for as long as people have had to make decisions and deal with uncertain situations[1]. The greater the uncertainty – brought about by the ever-increasing rate of change of modern society – the greater the need for information and the more valuable is the information which reduces uncertainty.

The contemporary business economy is voracious for information: from R & D and patents to product intelligence, from manufacturing to marketing and consumer research. Tactical and strategic information is an essential resource for all enterprises, whether big or small. Indeed, large sectors of the world economy, such as banking and finance, trade, insurance, transport and tourism, are practically information machines.

Each year more information is produced than the whole of writing from the dawn of history to the start of the twentieth century – and the rate is increasing. The amount of recorded knowledge in the world is doubling roughly every seven years [2]! Technology has provided the means to store, or reference, vast amounts of information on computers around the world. It also provides the means to identify and retrieve salient information so it can be usefully exploited.

Despite living in what is widely regarded as the information age, many businesses are still not benefiting directly from the availability of this fund of human endeavour. In a capitalist society we must look to the information supply market to understand why information use is suboptimal and how steps may be taken to rectify the problem. Analogies with consumer products markets are not only a useful aid to understanding but provide pointers to areas needing development. These should ultimately lead to market expansion which would be good news for the information industry and for the economy which will benefit from improved business efficiency.

Consumer products as a market model

In general terms, manufacturers process raw materials into products which are then sold to consumers. The more processing required, the more value is added and the more potential there is for profit. Indeed, sophisticated products are normally produced by a chain of manufacturers each able to concentrate wholly on a particular processing or assembly stage and each adding value. The influence of competition in the market stimulates the development of strategies, tactics and innovations designed to safeguard particular sectors with common attributes. The more competition, the more market segmentation occurs based on specialism and a wide diversity of products results.

The appearance of wholesalers is the natural consequence of specialization, in this case in distribution to retailers rather than selling to consumers. Direct selling by producers or manufacturers to consumers is difficult to achieve with the efficiency necessary to compete with specialist retailers. Wholesalers facilitate the supply of goods to a much wider customer base than a manufacturer alone could cover effectively. It is self evident that the organization, skills and resources required to sell a product such as a computer are entirely different from those needed to make the microchips out of which it is made.

Active markets are in a constant state of flux as competitors vie for market share and strive to expand the total market value. This is manifest as advertising, to assist placement of products in new or existing market segments and develop a brand image, diverse sales techniques, product and competitor intelligence, innovation, mergers, acquisitions and co-operative ventures. A host of specialist support agencies grows up to service these and related activities.

The consumer products market model has four essential and interdependent elements: the manufacturing chain, the distribution system, the market support services and the consumer. The attributes of any market are reflected in the relative importance of each of these elements. The total value of the market depends on the number of consumers and on the value added to the raw materials. The value is increased by encouraging existing consumers to pay more for increased added value and by enticing more consumers to participate in the market.

Information market evolution

The traditional information market, developed to maturity over centuries, consists simply of the author/consumer, who both generates and consumes information; the publisher (equivalent to the manufacturer); and the booksellers and libraries operating as the distribution network. Public libraries occupy a position in the market unique to normal retail supply chains providing free information at the point of delivery. This derives from the inherent longevity and reusability of some information and long-established social policy. The availability of an apparently free service has had profound effects on customers' perception of, and willingness to pay for, information. This perception will continue to perturb any developing information market for some considerable time.

Some two decades ago the traditional market, totally dominated by the printed page, began to be irrevocably destabilized by the introduction of computer technology. Increased accessibility to information was facilitated by developments in storage, retrieval and delivery by electronic means. This led to a revolution in the information industry and an entirely new market sector developed quickly. This burst of activity, still continuing, has been responsible for considerable expansion for the total information market. Many traditional publishers entered the new market along with a new breed of information entrepreneur. Intense competition has developed within and between the two sectors with some publishers clinging myopically to traditional views of ownership. Whilst these are slowly becoming obsolete, significant development of the market remains badly constrained by such views.

There can be no doubt that the information market is becoming more sophisticated. Technology has played, and will continue to play, a leading role. This is apparent from the ever-increasing range of information sources and products, and the software available for managing information. Particularly noticeable is the way in which new technologies have stimulated a much more important role for end-users in shaping the emerging market place. Information providers (in which category we must include both commercial and internal company brokers) have rightly exploited technology to expand the market for information products, particularly in the areas of retrieval and delivery. We are now seeing the development of technologies not only for new product opportunities (eg CD-ROM, user-supportive gateways, artificial intelligence) but also to differentiate between individual products. This is the almost inevitable response to increasing sophistication and competition in any market-place.

Regrettably, libraries have, on the whole, been ill-prepared to adjust to a new and undoubtedly crucial role in the modern, information supply chain.[3] They have been considered slow to adapt to the information scene changes in the last two decades, particularly in Europe relative to the US, and especially in the uptake of new technologies available in the electronic information market. Many are failing to react to the pace of change. They remain geared to the simpler market based on the printed word and are in danger of being lost to posterity. Despite being at the vanguard of the information revolution in the early 1970s, heralded by the availability of online information, they neither appreciated the importance of their emerging role nor exploited their technological lead or privileged position. Undoubtedly, this resulted from their traditional role as custodians of 'free' information rather than purveyors of an important and powerful resource.

The electronic information sector now represents a substantial market in its own right. In Europe and the US, electronic information usage is growing at over 20% per year. An increasing proportion of online traffic is now classed as business information. In 1988 the worldwide turnover for online databases and real-time information services accounted for around 7 billion ECU, with a share of around 2 billion ECU for Europe[4]. Recent reports[5] suggest that the European market is worth 4.4 billion ECU and that growth in real terms will be 14% annually over the next five years.

Despite the size of this market and its growth rate between 1988 and 1991 of 18% per annum, the marketplace itself is primitive compared to the markets for most other consumer products[6]. These are typified by strong retail and wholesale sectors giving rise to massive product differentiation based on devices such as packaging and presentation. This gives consumers tremendous choice. Similar market development has not taken place in the electronic information industry which is still described as immature[7]. This industry is dominated by a relatively few, powerful, online hosts, publishers and database producers. The hosts, in their role of making databases available, are functioning as information wholesalers. Conspicuous by its absence is a realistic retail sector.

The online information market retail sector

We can be sure that any substantial increase in the take-up and exploitation of information will not come from the traditional market based on print media. It must come from new products based on new computer technologies, and substantially led by new players. By looking closely at the structure of the electronic information market we can identify that the retail sector is very weak. An analysis of this market sector will indicate why electronic information is not more widely used.

From the consumers' viewpoint the market has not developed much beyond the concept of warehouse-to-consumer. In this context the online hosts are, in effect, reference data warehouses. Of course it is possible for consumers to benefit greatly from this trading mechanism, as we have seen particularly in the rise of direct-to-the-public furniture warehouses. But this style of trading is not to everybody's tastes and tends to be appropriate mainly for the cheaper end of the market. Information warehouses when compared to factory warehouses, are somewhat more difficult to access for the occasional consumer and even more difficult to get product satisfaction from.

The electronic information market sector has not yet been able to shake itself free of the printed sector, either in practice or consumer perception. Some new electronic products are effectively electronic reference works (eg CD-ROM). They have more in common with the printed sector by virtue of their fixed price and tangible presence which can be catalogued, stacked on shelves and treated as any library acquisition. This might explain why they have found much favour with libraries and the DIY information consumer. However, they are still only collections of data to which the user has to apply intellectual effort in order to extract any useful information.

In the case of CD-ROM, it is arguable that the technology would never have become as well established had the online hosts been responsive to the needs of users outside their normal user communities. Relatively sophisticated hardware and technology is needed for CD-ROM, and solutions are seldom as easily implemented and as cost-effective as we might be led to believe, particularly when networking is the only way to keep costs viable[8]. The main arguments in favour of CD-ROMs compared to online data have been their fixed price (enabling unrestricted usage to be offered free at the point of delivery with no budget worries) and friendly search interfaces. Both issues could easily have been tackled by database hosts.

The first centres squarely on pricing policies. In general, users have not been given the option of realistic, fixed-price, subscription contracts[9] and other innovative mechanisms in addition to the standard 'pay-as-you-go' mechanism. Fixed price contracts already provide information for some large corporations which is disseminated free to their end-users at the point of delivery. The Bath ISI Data Service on JANET has this pricing mechanism and it has proved extremely popular; monthly accesses are now in excess of 24,000[10]. The second issue is one of user support – or rather the lack of it. Hosts have been slow to provide the sort of user interface and post-processing utilities that contemporary information technology users have come to expect. Host and network-based menuing systems are slowly becoming more common, though most are still woefully inadequate yet. Effective search-support software is not widely used although it offers a single interface to hundreds of databases rather than the situation with CD-ROM where users may be expected to learn a new retrieval system for every subscribed database! And how many hosts are there which provide utilities for handling, analysis, re-packaging or re-presentation of data – the type of facilities which make utilization of downloaded data more valuable and, consequently, more generally appealing[9b]?

The contemporary retail information sector

The retail online information market is essentially represented by what have become known as fee-based information brokers. These form a relatively new and, as yet, small sector of the market[11]. In the UK there are only some 160 or so independent, commercial information brokers listed in the *Directory of Information Brokers and Consultants*[12] although there are operations such as patent agents and marketing firms which utilize electronic information in very specific areas. Even the US has only some 300 members of the Association of Independent Information Professionals, and the majority of these are one-man-bands[13]. The contribution of independent information brokers to the value of the UK industry in 1988/89 was estimated to be only £0.75 million with an annual growth rate of 17%[14]. Some have even mused that information brokers are an endangered species[13].

Based on market value, commercial information brokers are playing only a small supporting role in the marketplace. Their purchases of electronic information on behalf of clients is comparatively small. They tend to cater for the high value-added enquiry business in which information relevant to specific problems or queries is supplied on demand. It is a high add-value activity usually requiring significant intellectual input from the broker to make the necessary transformation of data into information. The cost of the service to the consumer is far greater that the actual cost of the data alone. The total volume of this business is small and likely to stay that way whilst being so labour intensive.

The role of the intermediary

The wholesalers (online hosts) have devoted scant attention to, and have had very little success in selling data directly to consumers[15]. That casual users remain unimpressed with online sources is entirely understandable considering the range of skills required to source and efficiently search out, then add value to, relevant data from the vast amount of information available. The necessity for computer hardware, arcane and difficult user interfaces, lack of support for adding value by processing, restrictive data pricing and ownership policies and the confusing copyright legislation have also played a role in effectively excluding all but the most enthusiastic end-user.

Perhaps most significantly, the attention of the online hosts and producers has been directed mainly to the supply of a raw material – in this case data. Having identified hosts as information wholesalers, this situation should hardly be surprising. However, decision-makers seldom want data in its raw state. They need its refined form – timely, usable information. Adding value in this way is an important role of some intermediaries, though others still judge the quality of a search by the weight of the print-out.

Most of the online traffic is channelled via intermediaries acting on behalf of consumers. As a group, they are responsible for a large proportion of the revenue generated in the online information industry. The majority of these intermediaries are not independent, but belong to large corporations or public bodies such as libraries. Corporate intermediaries correspond to the function we know in retail as 'buyer'.

Bridging the information gap

The current information market has a large number of diverse information producers. With the current size of the market this has led to over capacity, poor profit margins and protectionism. There is an active but small retail sector catering for the high quality market. There is an equally small business for wholesalers and producers supplying data directly to the consumer. We are entitled to ask why the mass market based on electronically-sourced information between these extremes is so poorly developed.

Only a tiny percentage of companies appear to have any strategy for the routine and systematic access to and use of formal information sources[16]. The bigger companies have recognized the necessity for high quality, timely information as one of the three prime assets of business, along with people and money[17]. Information is viewed as an intrinsic component of a profitable business operation and as a strategic resource. Large company information departments make widespread use of externally-sourced, electronic information. They use it for keeping their managers and technicians well informed about strategic environmental and operational issues and to address short term, current problems.

In many organizations there is a mismatch between the often-expressed belief in the value of information and a failure to plan for its effective integration into working practices. For example, a large research laboratory with an excellent, proactive information centre was developing procedures to meet their commitment to Total Quality research. Despite this, management found it difficult to understand that the provision of periodic, systematic literature reviews is a prerequisite of a high quality research project. Also, there is the case of a major, London-based consultancy firm which expects three information staff remaining after redundancies not only to generate high quality current awareness bulletins for some 150 partners, but operate an enquiry service as well. These are examples of mismatching which seems to stem from four common attitudes.

There is often a marked reluctance of management at all levels to admit that poor information is either a fact or a problem. Most managers have little comprehension of what information is available and of its potential value[18]. There is a tendency to consider that the information available to them is entirely adequate and that additional sources are unnecessary[19]. Some find it difficult to cope with the sheer volume, variety and range of information available – information overload. They tend to fall back on limited sources from experience or training from, in some cases, the distant past. Instead of analysing the logic needed to make a decision and searching out the information necessary to address it, some managers

free means that management often fails to commit sufficient resources.

There is undoubtedly a wealth of reference information which is not finding its way usefully to the consumer. A similar situation appears to exist in the supply of food in what was the USSR. There is no actual shortage of food but a chronic failure in the infrastructure needed to distribute it to the cities where it is needed. Additionally, information consumers are being offered data which most busy managers find difficult and tedious to assimilate. Few motorists would thank garages for dispensing crude oil by the barrel instead of petrol by the litre!

The preceding discussions have highlighted deficiencies in the structure of the information market resulting from the type of products which are available to consumers. We can conclude that existing information products cannot be sufficiently valuable or appealing to a sufficient number of consumers to generate a large retail market. This is not surprising given that there is a commonly held view by august members of the information community that users wanting information badly enough will overcome any obstacle placed in their path. This erroneous belief is potentially very damaging to the industry. It has been well established in other consumer markets that the world will not beat a path to the door of a better mousetrap builder. Every effort must be made to carefully lead the potential consumers into their purchases, even of the best of products.

The small markets which do exist cater only for minorities. The principal business of fee-based brokers is desk research, a service rather than a product per se. Whilst this market is expanding, it will be many years before making any significant contribution to the total value of the retail sector. It is a high value-added, high quality service with limited appeal to mass markets. It is a service which, in general terms, is a consequence of information awareness rather than one which attempts to encourage such awareness in non-consumers.

The opportunity

There can be no denying that there is a huge and largely untapped mass market for information, principally in organizations without the resources to

- appealing to a wide scope of target consumers
- high relevance to individual consumers, preferably tailored specifically to the customer
- manifest in a tangible product form
- immediately applicable at point of receipt without any more effort than reading
- inexpensive, to overcome the general reluctance of many users to pay for information, caused by the traditional view of it being free
- viable to produce
- self-sustaining – directly encourages repeat business

A valuable service commonly provided by corporate information departments[22] and even some academic establishments[23] is an alerting service, usually called current awareness. This service supplies information on a regular basis to keep a company or individual aware of current activity in a particular technical or commercial area. There is also evidence of its popularity from the fee-based sector. Current awareness information has been identified as one of the six most requested services[24] by business people using Euro Info Centres.

The wisdom of being well informed in any chosen area via systematic procedures of information gathering, rather than reliance on serendipity, the grapevine, or the old boys' network, makes a fairly compelling argument. It is a service appropriate to anyone engaged in technical, managerial or scholarly endeavours. It functions best when tailored to specific needs. Its embodiment can be in document form which may be read rather than searched to glean its informational content. Its production can be largely automated which means that, given raw material at a reasonable cost, the economies of scale can keep the price to realistic levels.

It has been recognized[25] that once users start using information the benefits encourage them to come back for more and more, providing there are adequate support services:[26] '...information can become addictive – the more you use the more you need'[25].

This being the case, provision of information to a mass market could be expected to generate a chain reaction. This will invigorate industry, by virtue of improved information flow, and the information retail market sector.

Clearly, current awareness services represent the type of product which offers the opportunity of making a significant contribution to the mass market, retail sector of the information market. In the following sections we will look in some detail at the wider aspects relating to current awareness products and their potential role.

Current awareness as a product

There are many current awareness products available but they fail to meet several of the criteria above. Services are typically restricted to printed media and produced by manual scanning of a special journal set to meet a particular niche market. They are often by-products of the core business activities of an organization such as SHELTER or a trade association. Some of them are undoubtedly sold as a marginal cost-recovery exercise. Few are truly profit-making.

Existing electronically-based, retail products have been almost completely restricted to data in bulk which must be worked on by skilled staff. These do not deliver information at the point of receipt. Typically, many hundreds or even thousands of bibliographic records are distributed on a regular basis on magnetic tape, CD-ROM or diskette. The customer's intermediary often disseminates subsets as broad coverage bulletins. The uptake of tape-based services has generally been poor although CD-ROM and diskette services have proved more popular. Examples of the diskette category are ISI's Current Contents service and the RIS/Microinfo Reference Update service which both cater only for delivery to their proprietary text retrieval package. The elegant logic of this, well recognized in marketing circles, is quite clear. Users need the text retrieval package to get the service and vice versa. The technology effectively locks them into both.

There are some major barriers for bulk data delivery services to seriously penetrate mass markets. The receiving organization often has to pay for vast amounts of data in which it has no interest. It needs an intermediary to select and collate the relevant data using sophisticated, bibliographic information management tools. Customers seldom have the facilities necessary for even basic value-adding exercises such as storage for retrospective searches. Indeed, customers, and too many intermediaries, lack a general awareness of the benefits of even simple processing (such as reformatting or user-specific selection[27]). Significantly, these factors are changing as the computer literacy of customers and providers increases. This will stimulate a demand for individually customized information products rather than the broad-brush, bulletin approach which is so familiar.

Many providers (particularly commercial brokers) will want a share of a developing current awareness market but without the problems of becoming hosts, developing information management software or committing themselves to any particular commercial product. Users and their intermediaries will want the freedom to combine the products of several services seamlessly. They will not want to run separate retrieval software for each service. Providers need to move away from the product-oriented approach, made famous by Henry Ford ('you can have any colour you like providing it is black'). Instead, a customer-oriented approach must be adopted in which individual customer needs are established and satisfied - often called the Total Quality approach[28]. The latter seeks to match the requirements of customers with suitable products rather than matching customers to the narrow range of products available. This means nothing less than:

- delivering information closely matching a customer's current interest profile (which we all know as SDI - Selective Dissemination of Information)
- tailoring the delivery format to the customers' house style or to be compatible with the local bibliographic data management system

A new and more appealing current awareness product would need more intrinsic added value than many currently available, without a concomitant increase in cost. Except in areas where information is viewed as being particularly valuable, making cost a secondary consideration, most intermediaries would be unable to provide adequate current awareness information at a viable cost by manual means. Inevitably, this means automation, dispensing with labour-intensive tasks on the part of the providing intermediary which represents a large cost element. A wide subject coverage is needed to appeal to mass, rather than niche markets. This is easily provided from electronic data sources. With a large part of the value-adding processing automated, the price of the product to the customer would reflect the cost of the data and the level of computer and physical re-processing required to meet the precise needs of individuals.

It is unlikely that many businesses would wish to commit themselves to the substantial cost of developing in-house automated systems to realize this goal. Gearing up to automate the processes to gain from the economies of scale is a substantial investment which detracts from core business. This presents an opportunity for a bibliographic data processing service to provide these facilities under contract. The end-user's intermediary could then concentrate on subject expertise with the third party providing the managed service based upon informatics technologies and operational systems.

Producing a current awareness product

A current awareness product based on electronically sourced data would begin as an SDI profile on one or more target, online databases. We know that existing SDI facilities offered by hosts have not captured a mass market, even via intermediaries. We can conclude that this solution cannot be sufficiently appealing to mass market customers. One problem is certainly that largely unrefined data is being delivered rather than the information which is actually required. This reflects inadequacies with the format, presentation and organization of the data as retrieved rather than its content. This must be overcome by processing the data before delivery. Turning it into information increases both the value and appeal so that the minimum purchase threshold is reached more consistently.

Re-packaging to enhance presentation, reformatting to facilitate importing into extended information management systems, and bibliometric analysis to improve assimilation and understanding are examples of how data may be converted into information[27]. Regrettably, these are still not common activities amongst intermediaries and software to perform such processing is relatively scarce. This reflects the predominantly product-oriented approach of most intermediaries (rather than the more accommodating, customer-oriented approach) coupled with a poor appreciation and uptake of computerized, post-processing technology.

Restrictions on the free market for information

Opportunities to develop new services, such as current awareness, based on new technologies are confounded by the traditional, and to a certain extent inappropriate, views of information ownership and intellectual property rights. Even recent legislation has still failed to accommodate the special needs of the online information industry. Under the copyright legislation of 1988, online information seems to fall under the category of cable-programme[29]! Undoubtedly, these issues are a severe restriction on the development of market opportunities. Inadequate copyright safeguards are coupled with, or the result of, a rapid and confusing proliferation of differing licensing terms and conditions for online data which govern retention and re-use. This has been identified by EUSIDIC and others[31] as counter productive for the consumer, the provider and the information industry as a whole.

Many publishers exclude any storage, copying, re-use or re-distribution of data without prior written consent. In this respect the precise status of brokers and contract data processors is unclear, even though it is generally accepted that brokers act as agents and charge for services rather than sell on the information. Of the main hosts, only DataStar has a specific brokers' agreement. The Joint Consultative Committee Working Party on copyright will be seeking clarification on this issue with the rights owners in the near future[31] but it is the contractual terms and pricing which will continue to govern a commercial free trade in information[32].

Electronic publishers need not seek the permission of, nor make payment to the originating authors for including bibliographic information and abstracts in a database, although they are entirely dependent on their work. Judging from the restrictions in published licence conditions on trading information[33], producers do not acknowledge that selecting a relevant subset of data requires intellectual effort on the part of the searcher. It is precisely this selection activity which may afford databases copyright under a proposed new EC directive[34]. It is important that data is re-cycled back into the community to stimulate more authors to produce the next generation of data. This cannot be achieved in the face of unreasonably restrictive terms and conditions. Would it be considered fair if microchip suppliers took a royalty on every computer using one of their products or controlled their precise usage? But that is precisely what data suppliers seek to impose. Denying the facility to add value to data as part of an information supply chain to the eventual consumer can only stifle free trade which is unlikely to be good for anybody in the long term.

Presenting the case for current awareness products to intermediaries

The preceding discussions have been largely theoretical. The remainder of the article will explore current awareness products from a practical angle. Products need to appeal to intermediaries as well as end-users for it is they who will determine how well products are accepted initially. Two perspectives will be considered, the fee-based intermediary and the corporate intermediary/librarian. Brokers stand to benefit directly from a share of the increased value and size of the information market. Even though the latter do not profit from the market directly, there is the benefit of more job security resulting from the uptake of more services by internal customers who provide the organization's wealth.

Many fee-based brokers' services undoubtedly rely on the personal touch for searching and producing finished documents, as well as for customer care. This is a strength but also a weakness. The reliance on intellectual effort means that any increase in profit must be matched by output which, in turn, means a commitment to more personnel. Brokers would benefit from a range of products which need minimal servicing and which may be sold in an 'over-the-counter' mode (c/f insurance brokers). Existing skills in customer liaison would provide the customer support vital to keep mass market customers returning[25].

It seems that nearly every information industry publication we pick up these days is exhorting librarians and information scientists to market their services aggressively and to be 'proactive'[35]. In the public sector, charging for services, particularly for business information, is becoming increasingly widespread. These demands bring in their wake many activities which are unfamiliar to information intermediaries. Eliciting the views of users, tailoring existing services and developing new ones can be a tall order with ever tightening budgets. But without these activities there is a danger that budgets will shrink further - a vicious circle which may be all too familiar.[36]

Current awareness is a proactive service which is particularly valuable when used properly[37] as part of an integrated and systematic information and intelligence gathering operation. The kudos for the information centre or enhancement of professional status for a broker which accrues from pre-empting an enquiry, highlighting an opportunity or threat before it has come to the attention of senior management may be very beneficial! But, in comparison to on-demand enquiry services, current awareness has a much lower 'profile'. There are also the obvious operational problems associated with repetitive execution, editing and delivery of searches in large numbers. Manual servicing of profiles is tedious, time-consuming and often is simply not worth the effort. Automating the processes is a substantial investment which can be difficult to cost-justify.

In busy libraries and information departments these considerations often mean that available resources are directed to other activities because of the pressure to 'deliver' to order. Brokers find there are insufficient profit margins for anything but a premium service for important clients. These problems represent an opportunity for an extension of the existing information supply chain once it is recognized that services need not always be tackled exclusively in-house. This would take the form of a managed alerting service. The essentially mechanistic procedures of saved search execution, organizing, repackaging and re-presentation of data would be automated. This would enable the service to be offered to a large client base. Savings resulting from the economies of scale, compared to manual provision by the intermediary, can be passed on ultimately to the customer.

An automatic alerting service managed by an external agency should provide the necessary current awareness information without stretching budgets or resources. The information centre or broker is then able to offer a valuable new facility to the customer group. The technology takes care of the data organization and manipulation (eg formatting, classifying, presentation) leaving more opportunity for the intermediary to improve quality with intellectual input (eg analysis, judgement, selection). Clients then benefit from timely, cost-effective information matched precisely to their needs.

It is instructive to note that a survey of their customers by a large US information broker, FIND/SVP,[25] revealed a large proportion (80%) had access to internal company information/library facilities. It suggested that the right atmosphere for a customer decision to buy and use a sophisticated information product may exist only in highly information-conscious individuals or in corporations which already have information intermediaries (such as libraries or research departments). The information purchasing decisions being made were related to the ability of the provider, whether in-house or third party, to supply desired results. Find/SVP observed that, 'This is good news both for corporate librarians and for information retailers, who need no longer view themselves as locked in mortal combat.'

Conclusion

In the contemporary business climate we know that there is a need for more widespread and systematic use of online information. This means that there is an immense, latent demand for information products. Current research undertaken on behalf of the British Library indicates that there is a correlation between the success of companies and their usage of external information[37]. The problem is finding the right product portfolio at the right price to stimulate the demand. To do this it is constructive to compare the key components of the current information market with consumer products markets. The comparison shows us that the retail sector of the electronic information market is underdeveloped due to a lack of products appealing to the mass market.

Given the right products, commercial information brokers represent the means for even the smallest of enterprises to have access to all the same sources of information as the giant corporations. This includes competitor intelligence, company reports, financial and marketing information, patents, industry news and reviews, not to mention abstracts of almost every single scientific and technical paper ever published. In very few commercially competitive endeavours can small organizations compete on equal terms with large corporations.

Traditionally, libraries have been the principal source of information, particularly for scientists and technicians. But only the larger companies can afford to run such a luxury. Now, with a vast array of published material available from information warehouses, it is no longer necessary to finance a comprehensive library in-house.

Current awareness information has been identified as fulfilling several important criteria to make it a prime candidate for mass market exploitation. It is appropriate for the fee-based retail market sector and to hard-pressed, corporate library and information centres. Enabling technologies specially developed by third parties will release intermediaries from the essentially mechanical tasks related to the provision of current awareness information from these sources. A managed alerting service confers very considerable economies of scale which should release intermediaries to provide more information and higher quality services. It provides the means to add sufficient value to reference data to make it appealing to a mass market. At present there are not specialist suppliers of the right products which leaves an opportunity for an "infopreneur"[38]. But, in order to be able to operate to the benefit of all concerned, there are still some constraints to be addressed which result from the traditional views of ownership.

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Why computers do not translate better

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Abstract
The linguistic and computational complexities of machine translation are not always apparent to all users or potential purchasers of systems. As a consequence, they are sometimes unable to distinguish between the failings of particular systems and the problems which the best system would have. In this article I shall attempt to outline the difficulties encountered by computers in translating from one natural language into another. This is an introductory paper for those unfamiliar with what computers can and cannot achieve in this field.

Introduction

My intention in this paper is to provide some explanation for the difficulties encountered by present computer systems which attempt to produce partial or complete translations of texts from one natural language into another. The emphasis will be on what can or cannot be achieved automatically at present.

I shall not be concerned with the relative merits of different approaches to translation problems, for example, whether systems which switch between languages through some kind of interlingual representation are better than those which do not, or whether systems which employ methods from artificial intelligence are better than those which use more familiar methods of computational linguistics. Furthermore, I shall not be describing any particular system of whatever kind, past or present, nor shall I be giving details of methods of computational analysis or processing, or of methods of compiling and updating dictionaries, whether monolingual or bilingual.

My aim is to give an introduction, for those unfamiliar with machine translation (MT), to the main phenomena which must be taken into consideration, even if designers of particular systems have opted deliberately to ignore some of them. The aim is to highlight in the broadest terms those areas of translation which are relatively easy for computerized handling and those areas which are relatively difficult, and I am describing the present situation and make no predictions about the future. The purpose, therefore, is not to describe the inherent limitations of machine translation, but to give a rather simplified explanation of what may be expected from systems at the present time, whatever the particular methodology. (For more details about the way MT systems work see Hutchins & Somers 1992).

Finally, it should be clear that I am not providing a methodology for evaluating systems. Evaluation involves much more than the quality of translation, although that is obviously a most important aspect. It involves also, for example, the operational environment of the system: transmission and receipt of texts, formatting, dictionary updating, editing, and printing; the examination of the compatibility of systems with other computer facilities; and in particular the assessment of how the system might integrate into the working patterns, practices and attitudes of existing personnel in the organization as a whole.

System types

Although my object is not to describe the different types of systems available, a brief outline is in order. In broad terms, we may distinguish between *batch* systems which attempt to translate whole texts without intervention by human operators and *interactive* systems which require assistance during the translation process to resolve problems of ambiguity in the source text or to select the most appropriate word or phrase in the target language. In batch systems (so called because the whole text is processed as one task) the output produced generally requires revision by a human translator to a greater or lesser extent. This revision (or post-editing) may well be substantial if the text is intended for publication, but it may be minimal – or even absent – if the text is intended only for information-scanning purposes within an organization. As alternative modes of operation with such systems input texts can be pre-edited to reduce ambiguities and complexities of structure, or can be composed in a controlled language, in which words are as far as possible used in a single meaning only and in which sentence structures are kept to simple forms which computer programs are able to handle.

Why are some problems more difficult for computers to deal with than others? With this knowledge, users should be able to understand why when 'post-editing', certain types of errors need to be constantly corrected; why when 'pre-editing' texts or composing in 'controlled languages', certain types of ambiguity and constructions should be avoided, and why in 'interactive' systems certain types of questions recur again and again.

The methods for dealing with translation difficulties vary from system to system. In many cases, the ambiguities specific to the source language are tackled in operations separate from the treatment of differences between languages. Commonly three basic operations are recognized: the analysis of the source text, the bilingual transfer of lexical items and structures and the generation of the target text. Questions of ambiguity and choice occur at every stage. For example, resolving the ambiguity of English *cry* (meaning either weep and shout) would be part of a program for the analysis of English. On the other hand, the selection of *connaître* or *savoir* in French for the English verb *know* would be a matter for a separate transfer program. Analysis involves also the identification and disambiguation of structures, e.g. whether *'He saw her shaking hands'* means that he saw someone who was welcoming a visitor or he saw someone who was nervous or suffering from the cold weather. Transfer likewise can involve changes of structure, e.g. from an English infinitival construction *'He likes to swim'* to a German adverbial construction *'Er schwimmt gern'*. Generation is often incorporated in transfer operations, but when a separate component it might include procedures to distinguish between English *big, large* and *great* (about which more later) and to produce correct morphology and word order in the target languages (*ses mains tremblantes, er soll heute kommen*).

	Lexicon		Structure
Analysis	cry	weep shout	morph: laughs/laughing syntax: he saw her shaking hands
Transfer	know	savoir connaître	he likes to swim er schwimmt gern
Generation	[grand]	big large	ses mains tremblantes er soll heute kommen

In some earlier systems and still some present-day microcomputer systems, all these operations are incorporated into single complex programs. Obviously, such systems – often called direct translation systems – can only be designed for two particular languages and in only one particular direction. Many present systems, particularly if intended to be multilingual, have separate programs for each of these components; a procedure which in addition allows for easier amendment, expansion and upgrading. Such systems are commonly referred to as transfer-based systems.

A further difference between systems may be made at this point. It concerns the use of interlingual elements. The basic idea is that rather than formulating changes between languages in terms of transfer operations, translation takes place from and into an interlingua, i.e. elements or structures which are in some sense neutral for the languages concerned. At its extreme, the whole system is interlingual, that is, all analysis is aimed towards an interlingual representation, and all generation is from interlingual representations. Less extreme is the common use of interlingual elements or features in systems which are otherwise of the 'transfer' type. Whichever approach is adopted, however, the operations mentioned above have to be handled and it is the treatment of these problems that I shall be describing.

Methods of analysis and transfer

All translation is a problem-solving activity; choices have to be made continually. The assumption in MT systems, whether fully or partially automatic, is that there are sufficiently large areas of natural language and of translation processes that can be formalized for treatment by computer programs. In this paper I shall discuss the following types or levels of decision-making:

- the use of other specific words in the same phrase or sentence
- the use of morphological information
- the use of information about syntactic functions and relations
- the use of semantic features and relations
- the use of knowledge about the subject domain
- the use of stylistic preferences

Specific words

Decisions based on specific words are the easiest to apply and are capable of the highest degree of precision, but at the cost of some inflexibility. I shall illustrate with three types of problem: compound nouns, idioms, and metaphors.

All translators are familiar with the need to treat compounds as units to be translated. In many cases an attempt to translate each component of a compound noun would lead to ridiculous results: French *pomme de terre* is not *apple of earth* but *potato*. If there is a standard equivalent for a particular technical compound, then translators are obliged to use it. Many potential problems of homonymy can be averted by the entry of the relevant words in combination with others in dictionaries.

Take the word *light* for example, which can modify another noun in at least three different senses: as an adjective meaning 'not heavy', as an adjective meaning 'not dark' and as a noun meaning 'luminescence or illumination'. In theory, every occurrence could have any one of these senses, but if there are certain words which regularly occur with it, it would seem perverse not to make use of this fact. Thus many MT systems include entities for compounds such as *light bulb*; and indicate directly the target language equivalent (French *ampoule*, German *Glühbirne*). In this way the system can avoid a perhaps lengthy disambiguation process to determine which of the two senses of *bulb* is intended ('plant bulb' or 'pear-shaped glass') and in combination with which of the three senses of *light*; a process which would have to be repeated every time the compound is encountered.

For the lay observer, it might seem that the most difficult area for MT must be the apparently unclassifiable variety of idiomatic constructions. It is a view which has support in the apocryphal stories of early MT systems which translated *out of sight out of mind* as 'invisible idiot' and which made such a mess of *The spirit is willing but the flesh is weak* (cf. Hutchins 1986).

The perceived difficulty of idioms is that the individual words take on meanings and connotations which they do not have in their literal usages. However, it is precisely because most idioms are relatively fixed expressions, consisting of the same words in the same sequence, that they can be easily translated into comparable idioms – or, if none exist, into literal equivalents.

Idioms can in fact be treated very much like any compound. For example, collocations of *cry* (as we have seen, a homonym meaning either 'weep' or 'shout') can constitute idioms of various lengths and complexities: *cry baby, cry out, cry off, cry wolf, hue and cry, at full cry, cry over spilt milk.* Such collocations are sufficient to distinguish the two senses, and at the same time to deal with the idiomatic usages. Hence, however idiosyncratic such idioms as the following (1) may appear, it is a relatively simple matter to enter them as units, as fixed phrases in the source dictionary, with their target language equivalents – whether those equivalents are themselves idioms or not.

(1) (a) bring to heel —► mettre au pas
(b) to curry favour —► chercher à plaire
(c) to cry wolf —► crier au loup
(d) to hit the nail on the head —► frapper juste
(e) to oil the wheels —► faciliter les choses

The same approach can be taken with many metaphorical usages, e.g. *mouth of river, branch of a bank, flow of ideas, channel of communications, tide of opinion, foot of the mountain, leg of the table.* Like idioms, metaphors of this kind can be treated as fixed compound expressions. We may note that among the European languages there is a common thread of similar formations, so that even if metaphorical usage is not recorded in the dictionary, it may be possible to produce a 'literal' translation which has a similar metaphorical impact. However, it would be a weakness in any MT system if it did not account easily for many metaphors which have become standard expressions of the language.

The advantage of treating certain word combinations as fixed expressions and translating them as units is the considerable saving in processing, particularly in the analysis of syntactic structure, and the assurance that the target output will be guaranteed to be correct.

The need for syntactic analysis is highlighted by one of the dangers of treating word groups as units. Consider the noun phrase *water pressure.* It would seem reasonable to treat this as a technical term with a fixed translation, i.e. *pression d'eau.* While there would clearly be no problem in a sentence such as:

(3a) The water pressure is low —► La pression d'eau est basse

there would be unfortunate consequences in a sentence such as:

(3b) To lift the well water pressure is obtained from the pump

Here the two words *water* and *pressure* occur in different clauses, and the desired translation is not (3c) but 3(d).

(3c) Pour faire monter le puits la pression d'eau est obtenue à l'aide de la pompe.
(3d) Pour faire monter l'eau du puits la pression est obtenue à l'aide de la pompe.

What is needed is some kind of syntactic analysis which identifies phrase boundaries before attempts are made to locate compounds in the dictionary. It is reasonable to suppose that if a MT system produces mistakes of this nature, then syntactic analysis is being treated as subsidiary to compound identification, and not (as it probably should be) vice versa.

A relatively minor complication is that occasionally idioms and metaphorical expression can be interpreted literally, e.g. *to oil the wheels* could be metaphorically *faciliter les choses* or literally *graisser les roues.* If there is only one translation given in the dictionary then the literal interpretation will be missed. It is not a problem to be exaggerated, since it is an easy matter for translators to make the appropriate revision. Indeed this comment applies to nearly all translations of fixed expressions. They are both easy for the MT system to translate and easy for the reviser to change.

Morphological analysis

It is truism to say that one of the most straightforward operations of any MT system should be the identification and generation of morphological variants of nouns and verbs. There are basically two types of morphology in question: inflectional morphology, as illustrated by the familiar verb and noun paradigms (French *marcher, marche, marchons, marchait, est marché,* etc.), and derivational morphology, which is form of the verb *walk*, and it should generate *marchaient* as the third person plural past imperfect form of *marcher*. (The alignment of English past durative and French past imperfect is however another matter involving the greater complexities of tense and aspect and their equivalents across languages – an area which few MT systems can deal with fully satisfactorily.)

An MT system which cannot go beyond morphological analysis will generally produce little more than word-for-word translations. It may cope well with compounds and other fixed expressions, it may deal adequately with noun and verb forms in certain cases, but the lack of any treatment of word order will give poor results. Nevertheless, the output of such programs can serve useful purposes in certain circumstances. A specialist in a particular subject area who knows something of the grammatical characteristics of the source language could well find that comprehension of the gist of the text was not impossible. There is, in fact, evidence that scientists have found the crude output of some of the early Russian-English systems to be of considerable assistance in keeping up with research developments. Another use for such crude output can be as 'pre-translation' versions for experienced translators. They have the assurance that the technical vocabulary has been correctly translated, and there is sufficient indication of the original sentence structure for them to rework output into good quality translation.

Syntactic structures

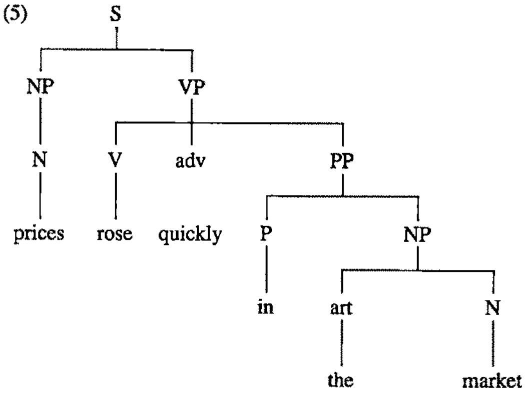
To go beyond crude word-for-word substitution demands at least some kind of syntactic analysis. I shall not attempt to describe the various approaches to syntactic analysis, and the complexities of structural transfer and generation. What I shall do is simply point out some of the major areas of difficulty, and the chief reasons for those difficulties.

Syntactic analysis is based largely on the identification of grammatical categories: nouns, verbs, adjectives. For English, the major problem is the categorical ambiguity of so many words, as already illustrated with the word *light*. In essence, the solution is to look for words which are unambiguous as to category and to test all possible syntactic structures. In the case of a sentence such as:

(4) Prices rose quickly in the market

each of the words *prices*, *rose*, and *market* can be either nouns or verbs; however, *quickly* is unambiguously an adverb and *the* is unambiguously a definite article, and these facts may be enough to ensure its unambiguous analysis as a phrase structure (5), where *prices* is identified as a subject noun phrase, *in the market* as a prepositional phrase, and *rose quickly* as part of a verb phrase. (Note that this particular analysis is not one necessarily found in any MT system and would not be adopted by many syntax theories.)

(5)



The example demonstrates that without using any semantic information it is in fact possible for some homonyms (*rose* and *market*) to be disambiguated by syntactic analysis. As another example, the word *return* can mean either 'go back' or 'give back' (with correspondingly different translations in other languages: *retourner, rendre, zurückgehen, zurückgeben*). The two meanings can often be distinguished by the simple presence or absence of a direct object (6):

(6a) She returned to the office ⟶ Sie ging in das Büro zurück
(6b) She returned the book ⟶ Sie gab das Buch zurück

The identification of structural context can also be sufficient for translation of words which are not homonymic in the source language but which have more than one possible equivalent in the target language. A familiar example is the verb *know* (7). Although there are other factors involved, the identification of the structures in which *know* occurs can often be enough to choose between *savoir* and *connaître* and between *wissen* and *kennen*, as shown in (7a) and (7b).

(7a) I know his brother ⟶ je connais son frère; ich kenne seinen Bruder
(7b) I know what he is called ⟶ je sais ce qu'il s'appelle; ich weiß wie er heißt

Structural changes are so common when translating from one language into another that the 'low-level' ordering of basic elements – nouns, verbs, object nouns, adverbs, adjectives – should be expected from any MT system. In French output, for example, the pre-nominal pronouns (*me, vous, le, lui, leur*, etc.) should be in the correct order and discontinuous *ne...plus, ne....rien*, etc. should be correctly placed. In German, the system should generate the correct placement of verbal elements in main clauses (*er hat es gestern empfangen*) and in subordinate clauses (*...daß er es gestern nicht empfangen hatte*), and so forth. This must be regarded as the minimum requirement, and any MT system which fails in this respect must be suspected of deficiencies elsewhere, probably of a graver nature.

Many structural changes are linked with specific lexical items, such as the *know* examples above and the following examples with *like* (in various meanings):

(8a) Young people like this music
→ Cette musique plaît jeunes gens
(8b) The boy likes to play tennis
→ Der Junge spielt Tennis gern
(8c) The boy was like his sister
→ Le garçon resemblait à sa soeur
→ Der Junge ähnelte seine Schwester

Such structural changes should be within the capabilities of most MT systems, but more complex restructuring may well be beyond the capacity of the cheaper systems. An example might be the treatment of complex German pre-nominal modifying phrases and clauses (9). For translation into English post-nominal structures, (9c) or (9d), the system must be capable, in effect, of recognizing the equivalence of the structure (9a) to a full relative clause (9b). In addition, the system should also 'know', when generating the English structure (9d), which parts of relative clauses (9c) can be omitted without loss.

(9a) Die in den letzten Jahren entwickelten Technologien...
(9b) Die Technologien, die in den letzten Jahren entwickelt worden sind,...
(9c) The technologies, which have been developed in recent years,...
(9d) The technologies developed in recent years...

The example demonstrates the need for syntactic analysis and transfer to operate as a 'deeper' level than surface relationships (such as those in (5) above.) What is often meant by 'deeper' analysis is the extraction of implicit functional relationships. In the following examples (10) the subjects of the subordinate infinitival clauses are implicit. Whereas in (10a) it is *Mary* who does the visiting, in (10b) it is *John* who is the visitor.

(10a) John persuaded Mary to visit his father
(10b) John promised Mary to visit his father

Semantic roles and features

The recognition of implicit relations may well require access to semantic information. It is common to identify two types: semantic roles and semantic features.

By semantic roles in a structure are meant the relationships of essentially nominal elements (entities) to basically verbal elements (actions or states): a particular noun may be the 'agent' of an action, another may be the 'instrument' (or means), another may be the 'recipient', and another may refer to the 'location', and so forth. Such roles can apply both to full sentences and to phrases (11):

(11a)
In Europe the rivers are polluted by chemicals from
loc rec [action] agent
industry
source

(11b)
the pollution of rivers by chemicals in Europe
[action] rec agent loc

(11c)
the industrial pollution of European rivers
source [action] loc rec

Unfortunately, there is no universally agreed set of semantic roles which can be applied without difficulty to any language. Developers of MT systems are usually obliged to draw up their own lists. But, despite the difficulties, analyses of case relations are almost essential when translating between languages of widely diverging structures, such as Japanese and English; compare, for example (12a) and (12b):

(12a)
The earthquake destroyed the buildings
inst [action] obj

(12b)
jishin de kenbutsu ga kowareta
earthquake by-means-of buildings (subj) collapsed

The instrumental role of the subject noun *earthquake* in English (12a) must be recognized if the appropriate Japanese structure is to be generated with *de* (by-means-of) following *jishin* and *ga* (subject marker) following *kenbutsu*. Similarly, the treatment of the *like* example in (8a) above can be assisted by aligning the semantic roles of the languages, i.e. both *young people* and *jeunes gens* are 'recipients' and both *this music* and *cette musique* are 'sources'.

Semantic features refer to labels such as 'human', 'animate', 'liquid', 'young', etc. assigned to lexical elements. They can be used either in conjunction with semantic roles or independently. For example, for the translation of English *eat* into German (either *essen* or *fressen*) it might be considered useful to distinguish between 'human' agents (13a) and 'non-human' (13b)

(13a) The boy ate the banana
→ Der Junge hat die Banane gegessen
(13b) The monkey ate the banana
→ Der Affe hat die Banane gefressen

Such features will have to be assigned to all relevant nouns (i.e. all that could be subjects of the verb *eat*); and they could then also be used in other sentences where choices between human and non-human subjects have to be made. As with semantic roles, however, there is no established set of features which can be applied to every language, and there are the two dangers of inconsistency and over-specification. The more semantic features available, the greater risk that compilers of dictionaries (whether the original developers or the subsequent users) apply them inconsistently. The dangers of over-specification can be illustrated by a somewhat trivial example. If it were held that the subjects of the verbs *drink* and *die* could only ever be 'animate', then the unfortunate consequence would be that the system would automatically reject *The car drinks petrol*, and *The secret died with him.*

The application of semantic roles and features in the analysis of noun compounds is no easy matter. As is well known, English nouns can be modified by other nouns functioning as quasi-adjectives, e.g. *water company*. The lack of explicit markers of the relationships can cause problems, because in many other languages these relationships have to be expressed e.g. by case endings, or by prepositions. Consider the English sequence adjective-noun-noun: the adjective can modify either the first noun (14a) or the second noun (14b), and in theory, each of these groupings is possible for every such adjective-noun-noun sequence since syntactic analysis alone cannot isolate the intended modification.

(14a)
private company legislation → legislation for
(adj n) n private company

hydraulic brake fluid → fluid for hydraulic brake(s)
(adj n) n

(14b)
private water company → water company which is
adj (n n) private

diluted brake fluid → brake fluid which is diluted
adj (n n)

The application of semantic features and roles would be one option, but it would require the detailed specification of what types of adjectives and nouns can modify which particular types of nouns and noun phrases (whether derived from verb forms or not). Not surprisingly, MT systems adopt easier solutions, namely either to leave the decision to a human assistant during or after translation, or to include noun compounds in the dictionary, i.e. *water company* and *hydraulic brake* are treated as 'fixed' expressions (with the potential consequence of incorrect analysis already mentioned.)

There is a further possibility and this is to make reference to a knowledge bank containing data about the subject domain.

'Real world' knowledge

While semantic features and roles in combination with syntactic information can go a long way in resolving ambiguities in the source language and in choosing translation variants, there are numerous instances where what is apparently needed is knowledge about the things and events being referred to. Take some simple problems of coordination. In the case of *black hat and shoes* it is likely that *black* modifies both *hat* and *shoes*; but in *red wine and cheese* the adjective is likely to refer only to *wine*. In fact, out of context, both phrases are ambiguous, just as out of context we do not know whether *old men and women* should be translated as *les vieux et les vieilles* or *les vieux et les femmes.* However, in the case of *pregnant women and children* we do know that *pregnant* cannot apply to *children*, so the only possible translation is: *des femmes enceintes et des enfants*. This knowledge could be incorporated in the dictionary, e.g. by limiting the use of *pregnant* to nouns with the features 'female' and 'mature'. Elsewhere morphological and syntactic information may be available, e.g. for the ambiguous phrase *smog and pollution control* in the following sentences:

(15a) Smog and pollution control are important factors
Smog and pollution control is under consideration

However, to resolve the ambiguity in the case of

(15b) we need non-linguistic knowledge:

(15b) The authorities encouraged smog and pollution control.

We know that what is more likely to be encouraged is the control of smog and not its creation. However, this kind of knowledge about human behaviour cannot be easily captured by semantic features in dictionaries.

More complex yet are examples such as the following, which have implications for the correct generation of French and German translations.

(16a) Having solved the problem, he went to bed
(16b) Having forgotten his book, he went back to fetch it

The relationship between the two clauses is implicit, and differs in each case: in (16a) it is a temporal relationship, in (16b) it is a causal relationship. Since French and German do not permit constructions of this kind, the relationships must be made explicit:

(17a) After he had solved...
→ Nachdem er das Problem gelöst hat,...
Après qu'il a resolu le problème,...

(17b) As he had forgotten...
→ Da er das Buch vergessen hat, ...
Puisqu'il a oubli le livre,...

Probably all MT systems have difficulties with this kind of construction. An examination of the semantic features of the verbs may suffice on occasions, but in many cases it will not. What seems to be involved, as in the *smog* and *pollution control* example, is knowledge about human behaviour; the system needs to have some kind of human-like 'understanding'.

It leads to the argument that good quality translation is not possible without understanding the reality behind what is being expressed, i.e. translation goes beyond the familiar linguistic information: morphology, syntax and semantics. The need is particularly striking in the treatment of pronouns. Human translators have virtually no problems with pronouns, and it must seem strange to many that while MT systems can deal quite well with complex idioms and certain complex structures, they all seem to have great difficulties with pronouns. Why do we get such errors as *die Europäische Gemeinschaft und ihre Mitglieder*, as the *European Community and her members*? The problem is that the antecedent of pronouns must be identified; the default translation of *ihr* as *her* does not work. The antecedent is often the immediately preceding noun, but certainly not always. Consider the following:

(18a) The soldiers shot at the women and some of them fell
(18b) The soldiers shot at the women and some of them missed

We can identify the antecedents of *them* from our knowledge of what happens in the 'real world'. It is knowledge which is very difficult to formulate in computer programs, but it is essential if the correct translations are to be made:

(19a) Les soldats ont tiré sur les femmes et quelques-unes sont tombées
(19b) Les soldats ont tiré sur les femmes et quelques-uns ont râté

The clear implication is that what is required for the translation of the more intractable problems of analysis and transfer is the availability of a knowledge bank of information which can be referred to during the translation process. For example, given a sentence such as the following occurring in documents relating to computer hardware.

(20) Remove the tape from the disk drive

The word *tape* can potentially refer to a 'magnetic tape' or an 'adhesive tape'. A knowledge-based system would check in its database which is most plausible in this context, i.e. it would seek to answer the question whether magnetic tapes can be removed from disk drives, or whether disk drives can contain or have as parts items which are magnetic tapes. If not, then it may check whether 'adhesive tape' is plausible. i.e. whether disk drives are things which can be packaged using this item.

As far as MT is concerned, the knowledge-based approach is to be found in only a few experimental systems. The principal reasons are probably obvious enough. Coverage of documents other than those within a narrow subject range would clearly require databases of massive proportions. While the computer hardware and the computer software for fast access may well both be already available, the databases are not. These would demand many years of difficult and complex work by many researchers. Therefore, it is not surprising that most MT systems are based exclusively on well known and well tested techniques of syntactic and semantic analysis and transfer.

Stylistic matters

One of the most distinctive features of texts produced by MT systems is their unnatural literalness. In general, they adhere too closely to the structures of source texts. Of course, human translators can be guilty of this fault as well – although Newmark (1991) considers literalness to be desirable in literary and authoritative texts, as long as the result is in the appropriate style. However, the aim in technical translation is generally to produce tests which read as if they were originally written in the target language. It is quite evident that MT systems do not achieve this goal. Indeed, it can be argued that they should not aim for idiomaticity of this order, if only because recipients of MT output may be led to assume complete accuracy and fidelity in the translation. It does not need stressing that readability and fidelity do not go hand in hand: a readable translation may be inaccurate, and a faithful translation may be difficult to read.

Nevertheless, it is reasonable to aspire to some degree of idiomaticity in MT output. It would certainly help MT to become more acceptable. Consider some of the possible translations of French *grand* and German *gross* into English.

(21)

grand succès/grosser Erfolg	great success
grosses Tier	large animal
grosse Hände	large hands
grand chef/grosser Führer	great leader
grande question/grosse Frage	big question
grand espoir/grosse Hoffnung	great hope
grande vitesse/grosse Geschwindigkeit	high speed

It is difficult to suppose that French and German speakers consider *grand* or *gross* to be polysemous (apart from recognizing a distinction between its literal use, referring to size, and its metaphorical extension, referring to achievement.) It is more plausible to see the choice of *big*, *large*, and *great* as a matter of stylistic variety to be handled in the generation of English. Even more so in the case of French *rapide* which can be *fast*, *quick*, *rapid*, *swift*, etc. according to the specific English noun concerned (*rapid development, swift progress, fast memory, quick response, swift action, fast access*, etc.). If there are any definable semantic differences among the English adjectives they are elusive.

In recent years MT researchers have paid increasing attention to methods for producing idiomatic output. A popular approach at present is the introduction of various kinds of statistical or probabilistic weighting of target language structures and lexical items based on large databases of examples of actual translations. In the case of *grand* and *rapide*, for example, a database of noun phrases in English and French translations (e.g. a greatly expanded list of examples as in (21) above) would enable appropriate renditions to be either extracted directly or derived by probabilistic pattern matching procedures. Statistical and example-based approaches have been made possible by the growing numbers of large textual databases, of all kinds of documents, and by improvements in computer analysis and processing of large databases.

Until such research advances much further, however, current MT systems are unlikely to do more – as far as the production of idiomatic output is concerned – than certain minimal kinds of transposition. In English, indirect objects can occur before direct objects (22a), particularly if they are pronouns (22b), but not if they are longer or more complex (22c). In the latter case, only the inverted form is acceptable (22d).

(22a) He gave the assistant the money
(22b) He gave her the money
(22c) He gave the assistant in the flower shop on the corner of the street the money
(22d) He gave the money to the assistant in the flower shop on the corner of the street

Stylistic preferences of this nature are easily handled. Others are not. For example, there is a tendency in many English document types towards a nominal style which is not shared in other languages. Whereas an English author might write (23a), the preference in many other languages would be something more like (23b).

(23a) The possibility of rectification of the fault by the insertion of a valve is discussed.
(23b) We discuss whether it is possible to rectify the fault by inserting a valve.

Changes to take account of such stylistic preferences are likely to remain beyond the capacity of most MT systems for the foreseeable future.

Conclusions

This account has, of course, by no means exhausted all the areas in which MT systems may have difficulties. For example, I have said nothing about the complexities of preposition selection, the correct choice of verbal tenses and aspect, or of the treatment of complex sentence structures. There are , in addition, failures of MT systems which have nothing to do with the problems of translation as such: gaps in dictionaries and simple mistakes of spelling and of grammar. Both can lead to systems failing completely to produce any version or to producing something which is incomprehensible. (However, even here researchers are developing systems which can cope with common spelling and grammar mistakes, e.g. *supercede, procedings, incidently, none of them were present, he did not here them, you must try and see the exhibition,* etc.)

Since the major problems of MT systems concern ambiguity, homonymy and alternative structures, it has long been recognized that one of the best ways of ensuring good MT output is to limit the amount of variation in the actual texts submitted to the system or to limit the system itself to specific text types or subject areas. The latter is exemplified by the well known Meteo system, which was designed for meteorological texts and for nothing else (Chandioux 1989). The former is being adopted increasingly: texts are written to conform to certain restrictions of vocabulary and syntax; certain words are to be used in one meaning only, and complex structures are to be avoided. For example, the word *replace* can mean either 'put back' or 'exchange' (24); the ambiguity can be avoided by using it only in the first sense and using *substitute* for the second sense.

(24a) Remove part A and replace it after cleaning
(24b) Remove part A and replace with part B.

Complex sentences may also be avoided, in order to ease problems of MT analysis. Thus (25a) may be rephrased as (25b):

(25a) Loosen the main motor and drive shaft and slide back until touching back plate
(25b) Loosen the main motor. Loosen the drive shaft. Slide both parts until they touch the back plate.

I shall say no more here about this approach, since it is clearly a way of avoiding problems rather than tackling them (e.g. Pym 1990); and my topic in this paper has been the difficulties encountered by MT systems when they do tackle them.

There are well-tested and familiar methods for word recognition, for morphological segmentation and for syntactic analysis. The use of semantic features and roles is also well researched and reliable. With these techniques it is possible to deal with a wide range of linguistic phenomena with reasonable success – but not always without problems. As I have briefly illustrated, among phenomena which can be relatively easily handled are: idioms and fixed expressions, phrasal verbs, basic word order (both in analysis and in generation), metaphors (when identifiable by specific words, the morphological and the syntactic disambiguation of homonyms, and the resolution of ambiguities by the use of simple semantic features.

There remain, however, many phenomena of greater difficulty. Some may not occur often in certain text types and some may not be critical for certain users (i.e. they can be handled easily in post-editing or in interactive modes of operation) – how much practical difficulty they cause depends largely on local circumstances. Among these relatively more difficult phenomena are: prepositions, tense and modality, coordination, subordinate clauses, pronouns, complex sentences, and stylistic variants (both lexical and structural). Various methods and techniques are currently being researched which may provide solutions; here I have mentioned knowledge-based approaches (Nirenburg et al. 1992), statistical methods (Brown et al. 1990), and the use of text corpora of example translations (Sadler 1989). At the same time, there are new approaches to linguistic formalisms of many kinds, and translators should note the increasing (if somewhat belated) attention being paid to the practical experiences and insights of professional translators.

I have attempted in this paper to outline the nature of the problems faced by designers of MT systems, and why these problems are relatively easy or difficult to tackle. Some problems may prove to be inherently unsolvable. Some are certainly intractable with present methods and at the present stage of knowledge. For others there are good prospects of viable solutions; research continues and we can hope for gradual if not dramatic improvements in the future.

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The evaluation of marketing information: some current practices and trends

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Evaluation is the judgement or determination of value. As value is, by definition, an emotive word it seems appropriate to begin by quoting the definitions of value that are used within the context of this paper.

(i) That quality of a thing according to which it is thought of as being more or less desirable, useful, estimable, important etc.
(ii) The worth of a thing in money or goods at a certain time; market price.

A unit of value may be monetary, but in the majority of the cases discussed in this paper, values have non monetary units.

The market value of marketing information is driven by the worth assigned to that information from within an organization. If, internally, it is viewed as a cost and not treated on a par with other assets, then it will remain a cost and little more. A self fulfilling prophecy. There is no shortage of examples of companies and institutions who have a wealth of data, do not give it value and so, by default, prevent the possibility of an external or market value being decided.

On the other hand there are an increasing number of organizations who have made the transition from ascribing value internally to realizing that value externally.

Safeways recently became the first major UK retailer to offer previously closely- guarded information about its sales to suppliers and manufacturers on a weekly basis. Huge EPOS investment has made this possible. Companies House, at one time a passive repository for information, is now generating revenue by making its information asset work for online users. Many companies, born as market research organizations, originally compiling data to meet narrow client criteria, are now increasing their product ranges by identifying profiles that are desirable (valuable) to their clients and using overlaying techniques to enlarge and enrich their clients database.

Such activities were almost certainly developed following an original commitment to value information internally. This commitment would have been made at a time when there were no proven success stories to reassure them they were doing the right thing.

In many cases there may be an awareness at senior levels that the process of evaluation begins internally and evolves to gain external acceptance, yet an older thought form generally has dominance within the organization.

This is the thought form that doesn't quite believe that added value can be created by a change of attitude alone. Service industries have now got the point and know that improved attitudes add to the bottom line. A new attitude which values information may be next. Currently there is only lip service to the concept that information is valuable. We know this because so few companies are evaluating their information.

This paper is structured to describe, in sequence, the three stages that are passed through during the process of evaluating information. The stages are :

Value definition
Performance measurement
Externalization

There are practices, some internal, others external to a company, which are inhibiting influences and affect the process of evaluating marketing information. These will be identified at the relevant stages where they have their effect. There are also new developments and practical activities which assist the process of evaluating marketing information and they are included with the stages that they most assist.

Value definition

The urge to survive is an organization's strongest, single motivator and profit is the means that is generally used in the open market, to ensure its survival. Therefore survival and profit will form the context within which all corporate activity occurs. If this is so, then values (the quality of a thing according to which it is thought of as being more or less desirable, useful, estimable, important etc. to the company) are those qualities which enhance profit. Values are intrinsically linked to profit. When a company values information it is because it has seen that information enhances profit and a measure(value) is put on information from then onwards. As these values are linked, however circuitously, to profitability and company survival when they change, so does the company profit.

It is not unusual for tension to exist between marketing and finance departments. Finance has values firmly rooted within the company context. Marketing has developed rapidly over the last twenty years and frequently has done so as a new department without

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being deliberately and fully integrated into the company's context. As the natural development of a marketing function takes it in the direction which will maximise its ability to communicate with its chosen marketplace it will value whatever helps it do this. If its values are not consciously aligned with the company values, then by definition what it produces (in this case information) will not be valued by the company as a whole. This results in marketing databases, brimming with useful data, contributing little or nothing to the net worth of the company and nervous finance departments unable to fully appreciate what value is being created with the investment into the marketing database.

In such situations before the process of evaluating the marketing information can begin, there needs to be more alignment of values throughout the company. One way to bring this about is by the use of a Value Status Questionnaire. Discover the information that people value now, what additional information they would also value and the information that exists which they do not value. This reveals the value structure within the company and identifies incongruencies and patterns of held values which are not aligned to the companys needs. Management action can then be defined to produce more alignment. Alignment at the level of values inevitably produces aligned behaviour and is a powerful management philosophy in its own right. Having done this there now exists a situation where it is known what information is valued internally so the channel is open for the evaluation process to continue. The next question is, how to measure this information practically.

Performance measurement

There is a widely held view that there is a pressing need for new parameters to be measured nowadays in order to truly understand what is happening within a company. Robert Eccles, professor at Harvard Business School, began his article¯The Performance Measurement Manifesto in the *Harvard Business Review* of January 1991, by saying 'Within the next five years, every company will have to redesign how it measures its business performance'.

Information on performance is commonly requested, yet how many organizations do you know that include in their business performance measures the measuring of the performance of their information? With the ever increasing investment in gathering, processing and using information the non-measurement of its performance is starting to become an issue. Not only is performance measurement of information one of the stages in the process of evaluating marketing information, it is also the first thing to do to be able to manage information. If it isn't being measured, how can it be managed?

Complexity

Viewing information as something that exists in its own right is a relatively new practice so it is not surprising that there is a requirement for new developments in this field. When considering measuring the performance of information, in this case marketing information, there is an intuition of the high level of complexity likely to be involved. So, in the absence of a clear payoff, there has been a predisposition to consider it impossible and explore it no further. The prospect of measuring and valuing information itself as it ebbs, flows and changes in a company, is about as appealing as manhandling surges of electricity was at the turn of the century. The rewards and possibilities resulting from the control of electricity have been immense and similar benefits await those who are taking a lead with information. Until very recently, the complexities involved excluded all but Cray owners from having the choice. A number of software breakthroughs this year have enabled the audit tracking of specific parcels of information to become a reality. This will be of particular interest to companies with large, complex databases which have been running for some time as a fairly high degree of inflexibility usually occurs with the passage of time. Tracking information or introducing new functionalities would probably have been a cripplingly expensive impossibility.

Using the tracking abilities of this software it is possible to see where information has come from, where it has been and where it ends up. Information is tagged in ways that enable analysis to establish the exact activities of the information. To what use is the information being put? Where has the information helped shape sales? Where is there a particular flow of information prior to the achievement of any objective and where is that information coming from? How much is the information that people insist must be available, actually used? Where has it been accessed? How long is that information of use to the company? When is it updated? All data cannot be kept but a lot of data is thrown away too soon, without considering what is actually happening with it. Why is it being replaced? How often is this happening? Are the answers to these questions known or are the questions even asked? Measuring the performance of the information permits management decisions which will lead, amongst other things, to maximum data accuracy for the maximum percentage of the time. The performance measurement will be measuring values which have been articulated and agreed in stage one. It is important to recall that these are values that have an effect on the company's profitability, so operational efficiency gains can be made.

Linking information to revenue

Performance measurements of marketing information open up the possibility of being able to see what information was required to secure revenue by attributing increments of revenue to identified groupings of information. Knowing where the information originated simplifies the allocation of an element of cost to the information. The resultant ability to link revenue streams with costed pieces of information is one of the building blocks necessary for auditors to consider accepting that the information is an asset. There is more reference to this when we come to the externalization stage.

A suggested framework

The development of performance measurements of information calls for a fresh perspective and those within the company are generally too close to the trees to see the wood.

A way of proceeding that has proved useful is to put together a framework which subdivides the development into four distinct areas, all profit related, which can then be focussed on independently. These areas are called the 'vital signs' of the information. Continuously relating these vital signs to profit will confirm that they are the most specific or most helpful. So far the following have been found to be the most helpful.

(i) The return the company receives for its investment in information.
(ii) The capacity the information has to generate revenue.
(iii) The ease of use of the information.
(iv) The sale value of the information.

Then, using judgement, select measurements that fall under each of these headings.

For example, measurements that fall under the second vital sign could be things such as:

(i) number of customers on the database
(ii) number of contacts on the database (as distinct from customers)
(iii) % total contacts that are clean (says something about the capacity of that information to generate revenue)
(iv) number of new prospects added to the database per month
(v) number of prospects who received mailed communications per month
(vi) mean contact or customer lifetime
(vii) conversion rate of enquiries to orders

Isolating the measurements to monitor and making up a picture of the revenue generation capacity leads to new perspectives on the way that information can be manipulated, changed and reorganized to enhance its performance. This increases its value as it will then be generating more profit.

Deriving measurements for the four vital signs gives a workable, usable framework for the company. It can see how its information is performing, compare it with past values and target future developments and improvements.

The evaluation of the information is now at a point where an external observer could be given sufficient information for him to be able to agree that the information does have an, as yet,undetermined value.

Externalization

The third stage in the process of evaluating marketing information is externalization. This is where the value given to information internally, having been measured and improved upon, is now sufficiently well documented that it can be compared with external standards to ascertain its market value. If the value has been comprehensively monitored internally there is much more likelihood of creating agreement externally for its cash value. Due to the shortage of external standards there is no universally applied methodology for doing this, though there are certain cases where it has been done and there will be more as time goes by.

Four distinct activities occur during the stage of externalization any one of which is or will be capable of helping a company establish a market price for marketing information.

Benchmarking
Information exchanging
Selling or leasing
Capitalization

Benchmarking

Benchmarking aims to create a framework of reference for an individual company's performance. Standards of performance are extracted from performance measurement data collected from a variety of external companies and then used to build this framework. Whilst immensely desirable in the field of information, the lack of existing performance measurements of information robs this process of it's raw material. Consequently benchmarking is in it's infancy in this field and an unproductive route to follow to fix a market price for marketing information.

Robert Bittlestone's new initiative known as the Performance Measurement Foundation may include the performance measurement of information within its scope. Once some standards have been set, benchmarking could begin.

Information exchanging

Direct exchanges of information (as a form of barter) is another activity filled with promise which has yet to manifest. The absence of any widely accepted information standards is the major barrier to the trading of information. An exception to this is AMIX (American Information Exchange) which is making a small degree of headway despite the inhibiting conditions. Still an unproductive route to follow to fix a market price for marketing information.

Selling or leasing

Sometimes an external observer decides that information is worth a certain amount for whatever strategic or tactical reason and will pay money for it. In those circumstances the evaluation of the information is inarguably what is paid for it. An example of this happened a few years ago when the mail order arm of

Next was sold to a German competitor. Stripping out the value of stock and property from the sale price, approximately £50 million was paid for the customer marketing information.

There is a developing marketplace for information in the UK with many directories and on-line databases selling marketing information. Market research companies offer information on FMCG, credit scores of companies and individuals, consumer preferences, socio – economic/demographic profiling etc. Any company is likely to have information that has some value in this marketplace. The more that company knows about its marketing information, the greater the value it will have.

In 1987, Strategic Resource & Information, a medium sized company supplying information to the computer industry, had developed controls on the performance of it's information. It's product was marketing information and it was able to evaluate this product using Standard Accounting Practices and show it as an audited asset in it's accounts. This was possible because S.R.I.L. could demonstrate that revenue was generated by certain pieces of information, that more revenue was going to be generated in the following accounting period by that information and the cost of collecting and processing this information could be proven. This route is open to exploration by any company holding marketing information where sufficient values have been attributed internally and measurements put in place.

An evaluation of marketing information can be confirmed by selling the title of the information to a leasing company and then leasing it back over an agreed period. Upon the company agreeing to satisfy specific maintenance conditions, the lessor judges what the information is worth and what asset value it has. The cash value of the marketing information is then paid to the company.

Capitalization

This is viewed by some as the acid test. If the value of marketing information is auditable and appears in the accounts, then it really does have a value. Accounting practices carry such weight because they are assumed to be uniform and comparable across companies and industries. However the adoption of differing accounting conventions prevents true uniformity.

There are murmurings among the accountancy profession regarding a new S.S.A.P. to deal with this area. The S.S.A.P.13 issued in 1977 to direct accounting for research and development can be interpreted to cover the issue of marketing information. As it stands, some accountants are prepared to value marketing information and record it's value as an asset at the lower of it's cost or net realisable value. The net realisable value in turn is probably going to be linked, some way or another, to the amount of revenue the information is expected to generate in future accounting periods. Then there is the discussion about how quickly the information depreciates. Any figures that are considered have to be supported with detailed schedules showing their origin in order to lay down a clear audit trail. A comprehensive record of measurements of the performance of the information is critical in making an evaluation.

Balanced against the attempts of accountants to find fair ways to evaluate marketing information there is the weight of investor opinion. This may well be the single largest impediment to marketing information being listed as an asset. Company performance is judged by the stock exchange and ultimately by the shareholders, who are the investors. While there is little appreciation amongst investors for the increased value of information there is little incentive for executives to declare information an asset. At best it would rock the boat with no political payoff. Only if the executive ensures the information is viewed internally as an asset, despite the external appearances, can this position be rendered harmless in the short term. In practice most executives may not do this so recognition of the value of the company's marketing information will be driven by changes in investor's priorities.

It is evident that there are many further developments necessary before it will be a simple matter for external observers to evaluate marketing information. In the interim it is worth remembering that it is by no means necessary for the externalization process to be fully developed before a company can have benefit from the process of measuring the performance of its information. It gives management power because it gives management clarity. Taking more control and becoming more aware of how marketing information is performing to create profit, has now become yet another management function.

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Current awareness or competitive intelligence: a review of the options

J E Rowley
Crewe + Alsager College of Higher Education

Abstract
Appropriate current awareness is central if a business is to maintain its competitive advantage. The basic components of current awareness systems are a database, user interest profiles, notifications, feedback and document delivery. Criteria against which current awareness services may be evaluated are database coverage, timeliness, cost, mechanisms for creating and maintaining profiles, print and display formats available, document delivery, feedback and relevance. The options for current awareness include internal and external services and range through SDI, bulletins, standard SDI, abstracting and indexing journals and other products. Often it is appropriate for an information manager to use a range of different kinds of current awareness products. Major areas that have undergone developments are: the increasing awareness of the need for competitive intelligence; greater emphasis on the needs of the individual; a wider range of delivery formats; opportunities to integrate data from internal and external databases; introduction of desktop publishing; and the changing role of the information professional.

Introduction

Appropriate current awareness is central if a business is to maintain its competitive advantage and if a public sector organization is to respond effectively to environmental change. Every professional, be they doctors, lawyers, librarians, or teachers, and every manager, whether in marketing, production, or information systems, needs to be aware of changes in the environment that impinge upon the organization for which they work. Although much useful news information is available in newsletters, journals, electronic bulletin boards and newspapers, it can be very time consuming for the individual information user to scan all of the appropriate sources. In order to support their employees in keeping up to date, organizations have traditionally provided current awareness services. Current awareness should:

1. Keep the information user up to date.
2. Save project time.
3. Aid in the creation of new ideas.
4. Save time and money spent on journals.
5. Reduce the paper flow through an organization.

Current awareness services can be divided into bibliographic and non-bibliographic services. Bibliographic services provide access to the literature of a subject field. Non-bibliographic services provide the information itself.

In 1985 I wrote an article that was published in *Aslib Proceedings*, which was intended to be a review of bibliographic current awareness services. On revisiting the topic addressed by that article it would seem that perspectives on current awareness services have altered dramatically, and in some surprising ways. It therefore seemed appropriate to attempt to update my earlier

current awareness services. There have been a few brief contributions (eg Wiggins, Hall, Ellis) describing local problems and individual practical solutions. Richards is a useful recent overview of methods and issues.

In the light of this recent lack of attention it is appropriate to review the basic current awareness tools identifying changes in their production methods and use. Finally, this article draws together some of the ways in which current awareness services have changed in recent years. All of the tools that were created for current awareness services are still in use, but the emphasis between different tools has shifted. Information managers often do not have the resources to build for the future. Whilst my earlier article (Rowley) focused heavily on the SDI facilities available as part of text retrieval packages this emphasis would be less appropriate today. Fewer information managers build extensive in-house databases. The larger organizations with a significant information requirement will still construct their own databases, but many effective current awareness services are more transient.

Components of a current awareness system

Figure 1 identifies the key components of SDI systems and the relationship between them. The following key components are identified:

1. Database
2. User interest profile
3. Notifications
4. Feedback to update coverage of database and user interest profiles
5. Document delivery

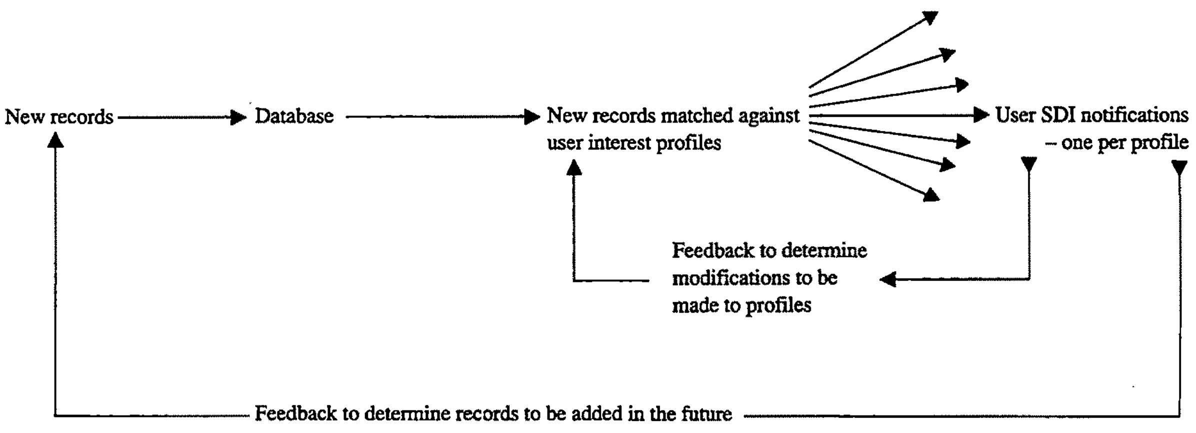
New records
Database
New records matched against user interest profiles
User SDI notifications – one per profile
Feedback to determine modifications to be made to profiles
Feedback to determine records to be added in the future

Figure 1: The components of an SDI system

may be grouped into bulletins which serve the needs of a number of users, and a broader profile may be maintained. Once notifications have been received by users, the service provider needs feedback on the value or relevance of the service, in order that the coverage of the database and user interest profiles can be modified to accommodate changes in user interests. Users require delivery of full text documents once they have reviewed notifications, particularly those drawn from bibliographic databases.

Criteria for the evaluation of current awareness services

The characteristics that make any current awareness service valuable will vary from one user to another. Key characteristics of any current awareness service are cost, currency and coverage. Most users will consider these alongside other criteria in evaluating current awareness services. A typical checklist is offered in Figure 2. The final criterion – relevance of outputs to user's requirements is the bottom line. If all other criteria are met, then this should also be satisfied, but it is still worth specifying this as a separate criterion.

Figure 2: Checklist for the evaluation of current awareness services

1. Database coverage, ie. subject and, for bibliographic databases, literature coverage of the service.
2. Timeliness or currency of the information provided.
3. Cost of the service.
4. Mechanisms for creating and maintaining profiles including any constraints and the user friendliness of the interfaces that support these activities.
5. Range of print or display formats in which records are available.
6. Document delivery services, especially to support current awareness associated with bibliographic databases.
7. Feedback Mechanisms
8. Relevance of outputs to user's requirements.

In-house versus external services

Library managers have always needed to decide which information services to produce in-house and which to buy in from external sources. In each case both options may be evaluated in terms of the criteria listed in Figure 2.

External current awareness services offer two main advantages:

1. They provide access to a large store of information, which the local library does not need to maintain and is available when it is required.
2. Data can be downloaded for further processing and easy packaging or, alternatively, added to an in-house database.

Currency is a major concern in current awareness services. Many users find that external services are lacking in currency. For a scientific database it may be three to six months from the date of original publication before abstracts are available online. Many CD-ROM products fare even worse on currency with a typical quarterly update frequency.

One other major disincentive to reliance on external current awareness is cost. There are some paper and disk based products from database producers that operate with preset profiles. These are cheaper than, for example, individual SDI.

External current awareness services may not allow the products or notifications to be packaged appropriately for all users. Many users prefer a current awareness service that integrates in-house and external information. Many information managers prefer to use external current awareness notifications as input to an individually tailored complete SDI package. For example, Beeson describes the use of data from Current Contents on Diskette and Medline on CD-ROM in a local current awareness service.

In general, information managers often find that one source for current awareness and one type of service does not meet all requirements. Several different services may be offered by the larger information unit to cater for the variety of information needs. This will involve using both in-house services and external services.

Finally, many organizations generate their own in-house current awareness products for reasons associated with commercial confidentiality. They do not wish to disclose to external agencies the areas that they are monitoring.

In-house current awareness services – non-computer based options

My earlier review article reflected a perspective that foresaw a future with current awareness services that were primarily computer-generated. Whilst this might still reflect the situation for bibliographic current awareness services, many of the current awareness services generated by information managers today are manual, and based on local scanning of newspapers, newsletters, journals and other published information sources. Such services may be perceived as more cost effective or more timely than external services. Often, there is no local requirement to maintain a long term database, because access to external databases can satisfactorily meet retrospective needs, and because current awareness is seen to be of most significance. For example, Strube and Antaniewicz reported the use of manual SDI services based on the scanning of journals for a group of researchers. Photocopies of the first page of each relevant article were sent to users.

Manual in-house services are generally based on local scanning of items that are entering the library. Notifications from this process that require minimal computer intervention can be fast because there is no data inputting process and the intellectual effort, compared for instance with a service that requires indexing or the production of abstracts will be low. Such services have continued to fulfil a role in an increasingly computer-based world because of the importance attached to timeliness. The renewed emphasis on competitive advantage and increased awareness of the value of business information, including marketing and financial information, has led to the extensive use of such services. In addition, organizations have become reluctant to make long term investments in information provision as in the past and there is a trend towards employing information managers to meet short term needs, rather than to build an information resource for the organization. Short term need often focuses on current awareness.

Typical current awareness services that might be produced through this channel include:

1. SDI or bulletins comprising sets of photocopies of title pages from journals.
2. SDI or bulletins comprising photocopies of the first page of articles (which will often include abstracts).
3. Newspaper cuttings SDI or bulletins which are often produced on a daily basis. Many such

Figure 3: External v in-house information services

Feature	*Local systems*	*External systems*
Confidentiality	Secure and controllable.	Exposes interests to outside organizations.
Coverage	Less extensive of published literature. May include internal documents eg. research reports, correspondence.	Covers greater numbers of documents in published literature, yielding wider discipline perspective.
Currency	Potential for being very current if primary sources such as newspapers are used.	Rather variable. Some real time systems, other databases may be 3-6 months behind publication of primary document.
Control	Awareness of needs of users. Can coordinate needs of a group of users.	May lead to no overall perspective of users needs within an organization.
Clients	Smaller more coherent group with less diversity of interests.	Larger groups with various employing organizations.
Products	More limited.	A full range of formats available.
Format + delivery	Current awareness available in format designed for majority of users. Delivery may be via internal network.	Delivery may be via external network.
Document delivery	From documents in local collection.	Need to use document delivery services.

bulletins may be based on cuttings provided by an external press cuttings agency in accordance with specified profiles.

4. Advertisement bulletins which list advertisements in specific areas and provide useful market intelligence.
5. Small bulletins of say titles of journal articles and news of events which may be word processed and/or desktop published. More ambitious bulletins will generally be produced as one product of a database. Nevertheless the advent of desktop publishing has offered the opportunity to improve the presentation of even the simplest bulletin.

In-house current awareness services – computer based options

Computer-based current awareness services can be generated as one product of an in-house database. Such databases are likely to be maintained with the aid of a text information management system or a database management system. One of the chief advantages of the database approach is that a number of different printed products can be generated from the same database. Indeed, many text information management packages were originally designed as a means of replacing a manually produced current awareness service, such as an abstracts bulletin. By the late 1960s generating an abstracts bulletin on a regular basis and maintaining indexes to the literature covered by that current awareness service was becoming extremely time consuming and expensive. A computer-based solution offered both a better service, with more flexibility and easier indexing and maintenance of the database in the longer term, coupled with lower costs. Figure 4 lists some of the text information management systems that offer facilities to support the generation of current awareness services. In general mainframe and microcomputer software offers more sophisticated options for SDI generation than micro computer packages.

There are essentially two different approaches to the packaging of current awareness services: bulletins or selective dissemination of information. In a bulletin all new records added in a specified broad subject area are made available to every user, typically in some printed form. This eliminates the need for careful pre-selection and direction of records, and offers the user the opportunity to browse, but on the other hand makes it incumbent upon the user that some time be spent selecting items of interest from the bulletin. Alternatively, SDI offers each user an individually tailored set of records which is appropriate to his particular requirements and has been selected to match the profile specified by that user. Often it is appropriate to offer SDI to some users and one of a range of bulletins to other users.

Figure 4: Some text information management services supporting SDI

Mainframe/mini-computer packages

Package	*Supplier*
BASIS	Information Dimensions Incorporated
BRS/SEARCH	BRS Software Products
CAIRS	Leatherhead Food Research Association
DM	Information Dimensions Incorporated
INFO/DB+	Doric Computer Systems
ORBIT	Maxwell Online Incorporated
STATUS	Harwell Computer Power
TINLIB	Information Made Easy Limited

Micro-computer packages

Package	*Supplier*
BOOKSHELF PC	Logical Choice
DATAFLEX	Dataflex (Information Management Services)
EXTRACT	Software Solutions
PROCITE	Personal Bibliographic Software Incorporated
STATUS/PC	Harwell Computer Power
SYDNEY LIBRARY SYSTEM	Soutran Limited

Both bulletins and SDI can be generated from an in-house database. That database will probably encompass input from several different sources. Typically some records will be locally generated from in-house scanning of literature, and others may be downloaded from current awareness products available in a machine readable form from other database producers. This might include sections of databases available on floppy, CD-ROM or accessible online via an online host. This process of transferring records between external databases and internal databases has been made significantly easier, especially when compared with the manual scanning of published abstracting bulletins that was once necessary.

The process is facilitated by software packages which can convert bibliographic records downloaded from online and CD-ROM databases into a file format suitable for importation into a text retrieval package. Examples of such packages are HEADFORM, SWISSTAR and BIBLIO-LINKS. Beeson describes the development of an in-house package, Reform, to re-format records from two CD-ROM databases.

There are a number of features of the output format of current awareness which are worth reviewing. These include: the output modes, output format and the output frequency. The possible output modes are:

1. to different types of printer eg. local printers, and remote printers, to produce a printed list which may then be dispatched to users.
2. to floppy disc for subsequent processing by other software, for example, to a desktop publisher or a database publisher.
3. to floppy disc for dispatch to users in machine readable form.
4. to screen via a network, possibly using electronic mail or bulletin boards.
5. to other computers via a network.

The user may receive current awareness notification in printed or machine readable form. Online current awareness has flexibility, especially if the user then has the option to print selected records, or to download records into their own local database. There are now a number of personal bibliographic software packages available which support users creating their own databases on PCs. Examples are Pro-Cite, Reference Manager, Bib/Search, AskSam and Notebook.

In a printed product, the output format, will be predetermined by the service supplier. With online current awareness the user may select which part of the record to display. Most text information management systems allow the information manager to design their own format or to choose from a range of pre-designed formats for records and generally document format. Additional refinements that are generally available in the larger systems include page formatting, choice of typefaces and page numbering.

Printed bulletins may include:

titles lists
abstracts bulletins
forthcoming events bulletins
present bulletins
lists of new acquisitions

Some of these may be generated without the intervention of a database system, and not all may be the products of one system.

In addition to the traditional SDI and bulletins, services may also be delivered via electronic mail and bulletin boards.

External current awareness

External current awareness services are available from two main sources: the online hosts, and the database producers.

First we will consider the services available from the online hosts. These services are primarily SDI from the databases mounted by these hosts. The most basic SDI facility is the Save Search facility which stores profiles that can be re-run at a later date. This is available on almost all hosts and usually both a Permanent and a Temporary Search Save are possible. With Search Save, however, the onus is on the user to execute the repeat search. Most hosts go further than this and offer a special SDI facility under this. A profile may be saved and run against specified databases. Profiles may be run every time a database is updated, or at wider intervals as selected by the user.

Such SDI services are available on a large number of databases in a wide variety of subject areas. Notification may be received in print format, machine readable format on floppy disc or CD-ROM or where hosts offer Private File facilities transferred to the file of a specific user.

Developments in the SDI available from online hosts which have made the services more valuable include:

1. Crossfile searching, or the ability to use one profile across several databases.
2. Elimination of duplicates, where records have been extracted from several bibliographic databases.
3. Downloading and more specific contractual agreements concerning the re-use of data.
4. The ability to handle graphics data such as trademarks and chemical structure data.

The other major source of external current awareness services are the database producers. Although there are a large number of database producers and it is difficult to present an overview of the kinds of repackaging that is conducted by database producers, most users and information managers are able to select specific database producers for further investigation on the basis of subject coverage.

The larger database producers offer some well established current awareness services. Such services will embrace basic bulletin type products and SDI. Typical products are:

1. Abstracting and indexing journals.
2. Standard SDI services covering a set group of topics. Examples are Research Alerts Topics marketed by the Institute for Scientific Information, INSPEC Topics from the Institution of Electrical Engineers, and CA Selects from Chemical Abstracts Incorporated. Broader bulletins are available from some database producers, such as INSPEC's Key Abstracts and BIOSIS's Bio Research Today.
3. SDI services are also available, such as Research Alerts from the Institute for Scientific Information and INSPEC (SDI) from the Institution of Electrical Engineers. Some of these SDI services offer notification in machine readable form. An example is BIOSIS B-I-T-S from Biosciences Information Services.
4. Current Contents services which offer the contents lists of recent journal issues are produced and marketed primarily by the Institute for Scientific Information. Current Contents are available in various subject areas and can be acquired in print format, on diskette or on CD-ROM.

Electronic mail and bulletin boards

Both electronic mail systems and bulletin boards are available through a number of networks. Electronic mail and bulletin boards may be operated within an organization to improve communication. In this context electronic mail can be useful for communicating new information to individual users. Bulletin boards are a means of making general announcements to all users of a network and can be used for the publication of newsletters, and other information services. In addition to internal communication external systems operators may use electronic mail to communicate with their users. For example the online hosts may make SDI notifications available via electronic mail and many operate bulletin boards for general announcements.

New Directions for current awareness services

Both the information user and the information manager acting on behalf of the user have a number of options when considering current awareness. The basic range of options has remained relatively stable over recent years and there is still a balance to be achieved between the use of internal and external services. The user's information needs have not changed although the user may have become more sophisticated in the quality of internal printed documents that are expected and in the use of information technology to support information dissemination, storage and retrieval. The major changes in recent years are:

1. Increasing awareness of the need for current awareness within organizations. Businesses need to work hard to succeed and it is increasingly important to monitor their environment and gather competitive intelligence. This focus on competitive intelligence has to some extent shifted the emphasis in current awareness services away from scientific and technical information, and towards business information.
2. Greater emphasis on the needs of the individual. Technology makes tailored current awareness feasible. Professionals have less time for environmental scanning. SDI services are becoming the norm, with bulletins taking a supporting role.
3. There is a wider range of delivery formats for SDI with both external and internal current awareness being delivered to the user either in printed form or via a machine readable form. The machine readable file may be on floppy disc or CD-ROM, or communicated over a network. This machine readable file may then be integrated into the user's personal file if the user chooses.
4. Availability of data in a range of machine readable formats, together with the availability of software for re-formatting data has facilitated the transfer of data from external to internal databases.
5. Even the most modest bulletin can now be processed with the aid of a desktop or database publisher with a good quality printer and presentation standards of in-house bulletins have improved significantly.
6. As the demand for tailored current awareness services increases the information professional needs a heightened appreciation of the information needs of the user. The effective information manager in the future will need to play a full role as part of a team, and not offer current awareness from a distance.

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On evaluating MT systems

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Introduction

The more I think about the title I selected for this paper, the more I am struck by its arrogance given not only the time available, but also the limited competence I have in a number of areas which are directly relevant to the assessment of MT systems. Having recently perused a good sample of the recent book *An Introduction to Machine Translation* by Hutchins and Somers did not help matters. Their Chapter 9, *Evaluation of MT systems*, offers an excellent overview of this specialised domain and all I can do is refer you to this chapter and the references therein for a thorough discussion.

What I shall be concerned with is a rather limited aspect of the assessment of MT systems: I will look at this question from the point of view of a potential user and I will mainly concentrate on this problem from a linguistic standpoint. The kind of evaluation I will be dealing with is 'black box' evaluation rather than 'glass box' evaluation. That is, I will assume that the examination of a given system is not done by developers/researchers but by users who have access only to inputs and outputs and who are particularly interested in the linguistic aspect of a system's performance.

One warning is in order from the outset: my potential user is in a sense a 'mythical beast'. Real users are not disembodied entities but businessmen, translators, teachers, students, MT specialists, computational linguists or whatever. Each type of background will trigger a different range of expectations. Moreover, evaluations are constrained by the type of system one is faced with: Are we dealing with a research system? Or with a near commercial system? Or is the system part of the translation work of a whole business team? How much post-editing is acceptable to these translators? These questions and others are highly relevant to the practical assessment of real world systems. The recently published paper by Isabella Moore *Criteria for selecting MT systems* (1990) provides a good example of the factors governing the choice of an MT system within a small business environment. By comparison, much of what I will say further on abstracts away from these problems. It is nevertheless my belief that the majority of the issues I broach in this paper have to be addressed if we do not want our evaluation to be random or 'dilettante' if I may be allowed a little foray into the French language.

Quality

Whatever system one is concerned with, the question of 'quality' of translation arises. The assessment of quality is usually broken down into broad categories of assessment. Traditionally, the translation of sentences would be split into 'form' and 'content' but this division is too inclusive to be of much use. In Hutchins and Somers (1992), it is suggested, along with other work in MT, that three criteria should be taken into account: (i) fidelity, (ii) intelligibility, (iii) style.

'Fidelity' requires that the same 'information' be conveyed by the target text and the source text. Various tests can be put forward. For instance, within the ALPAC investigation, people were asked to read the output and compare them with the original in terms of 'information'. Nowadays, in assessing the instruction manuals which accompany various products (say a coffee machine), the translation can be assessed in terms of a reader being able to carry out the tasks described in the translation. 'Intelligibility' typically involves a ranking of the text from perfectly intelligible to unintelligible. Various techniques can be used to refine measures of assessment: for instance the Cloze technique which involves the masking of a number of words, then asking readers to fill in the blanks and finally comparing the guessed words with the original. The relationship between fidelity and accuracy is an interesting one to study and it was the conclusion of Carroll's experiments, as part of the ALPAC report, that averaged over sentences and raters, fidelity and intelligibility scores were highly correlated. I can only refer you here to the paper by Lee Humphreys in this volume and the report he gives on evaluation criteria devised by the Essex MT group. The third criterion 'style', according to Hutchins and Somers, is as subjective 'as the global ranking of intelligibility' but they do point out that stylistic factors are important. Thus, in instructions manuals, very often, the translation from English into French of an imperative should be an infinitive and not an imperative, e.g.:

(1) (a) Depressurize hydraulic system
    (b) Dépressuriser le système hydraulique.

The overview by Hutchins and Somers is a very useful one. From a linguistic point of view, I will now present an alternative scheme which should cover all the points they make in a way which complements their approach rather than compete with it. In so far as possible, I wish to argue that good quality translation involves the following components in relation to sentences within a text. It should preserve: a) propositional content, b) thematic information,

c) pragmatic interpretation, d) stylistic value. I will not introduce a separate category of 'textual information' as the role of co-text is relevant for each area and induces in each case a partition in terms of higher vs. lower quality. A recent book which discusses the various parameters of human translation in an interesting way from a linguistic point of view is Basil Hatim and Ian Mason's Discourse and the Translator (1990).

Propositional content

The propositional content of a sentence is what is sometimes called the 'message' or the 'gist' of the sentence in everyday speech. In more technical parlance, specialists would speak of preserving the 'cognitive content' of a sentence, its truth-value, or its 'ideational' meaning in the linguistic theory of M.A.K. Halliday (see Halliday, 1985 – but for our purposes we can neglect the differences between various accounts of meaning). To take a simple example, consider a family of sentences such as:

(2) (a) Council gave these powers to the President
(b) Council gave the President these powers
(c) These powers were given to the President by Council
(d) The president was given these powers by Council

We expect an adequate MT system to give us a translation based on the information that there was an act of giving involving three participants (a source or agent *Council*, an object *these powers* and a goal *the President*). Put semi-formally, a basic type of information to be conveyed is a schematic predicative structure of the form:

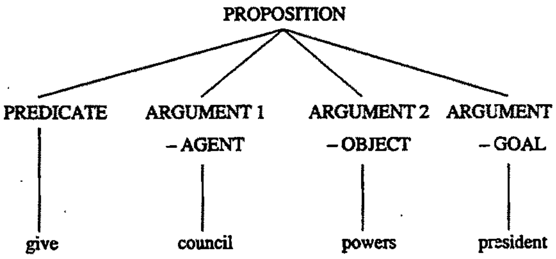

Figure 1

In addition, the information must be conveyed that the action of giving took place in the past, which we could express semi-formally as in Figure 2.

These trees are not given here as model representations but as a way of coding the information in question. In so far as the cognitive content of sentences is preserved – a mixture of fidelity and accuracy – a system can be said to be successful. Whether to achieve this it has resource to statistical techniques or linguistic techniques or a mixture of the two is not pertinent to the point at issue here.

It must be stressed that recovering the propositional content from surface strings is by no means a trivial matter. It requires among other things that a vast amount of disambiguation, both lexical and grammatical, has taken place. Leech in his introduction to *The Computational Analysis of English: a Corpus-based Approach* (edited by Garside, Leech and Sampson, 1987) notes that the grammatical analysis of the Brown corpus (officially known as the Brown University Standard Corpus of Present-day American English) which was based on a system called TAGGIT, had a success-rate of 77-78%. He adds: 'If this strikes the reader as an unremarkable achievement, it is worth bearing in mind that English is a notoriously ambiguous language with respect to homography – for example in the eight-word sentence *Norman forced her to cut down on smoking* each word is grammatically ambiguous, so that about 3500 different word-class labellings of this sentence (in terms of the labels provided by the LOB tagset) are in theory possible' (p.9).

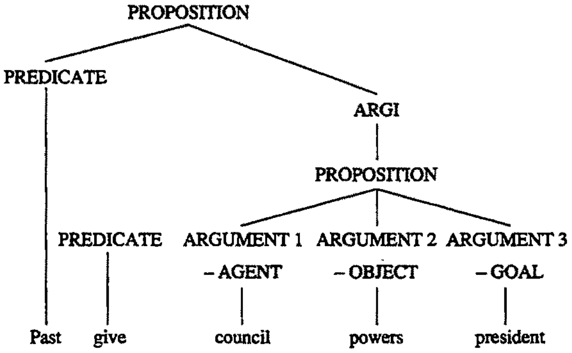

Figure 2

From the point of view of translation, ambiguity resolution is obviously fundamental for the preservation of propositional content. Consider, for instance, the following sentence from an article in *Le Monde* on the Greenpeace affair (part of a passage quoted in Hatim and Mason, 1990):

(3) A ce stade, il est impossible de savoir si ces trois personnalités sont directement impliquées, ou simplement concernées en raison de malentendus et de non-dits lors des discussions sur Greenpeace (*Le Monde*, 18.9.1985).

which was translated in the Guardian as follows:

(3') At this stage, it is impossible to know if these three were directly implicated or simply involved through misunderstandings and incomplete information during discussions on Greepeace (*The Guardian*, 18.9.1985).

We need to know that FR *stade* is not used in the sense of "stadium" (a case known as 'homograph resolution') We also need to be able to determine that the preposition *sur* in *des discussions sur Greenpeace* is triggered by *discussions* and not to be attached to *Greenpeace* and therefore could also be translated by *about*. There is a small syntactic clue showing that *sur* does not form a modifier group with *Greenpeace*, namely the absence of an article. If the discussions had taken place on the boat called Greenpeace, the French would have to be *des discussions sur le Greenpeace*. Such examples could be multiplied ad infinitum and I will spare you a long list of translation equivalents in various languages. What should be realized, however, is that fully determining the propositional content of an utterance must involve some strategy for accessing discourse and background information.

First of all, many ambiguities can only be resolved if the co-text and the context are taken into account. Secondly, when we talk informally of the message conveyed, we assume that the reference of pronouns has been fixed. But, in very many cases, the internal structure of the sentence does not give sufficient clues to resolve the matter. Much work in modern syntax helps to establish the sentence-internal conditions under which co-reference is allowed or forbidden but it does not offer a strategy for actually establishing co-reference in real texts. The work done by syntacticians is indispensable as shown by a brief consideration of the simple examples in (4):

(4) (a) Mr Delors spoke to him
(b) He spoke to Mr Delors
(c) Mr Delors wrote the report after he left
(d) After he left, Mr Delors wrote the report

We can see that in (a), *him* cannot refer to Mr Delors, nor *he* in (b). On the other hand, in (c) and (d), co-reference between *he* and *Mr Delors* is possible. Professional translators can effortlessly take such facts in their stride, but building all the appropriate conditions into an MT system is no mean achievement. And, in addition, as pointed out earlier, we need to actually fix the reference of pronouns to translate adequately between languages. 'They' is neutral between male/female and human/non-human in English but French, like many other languages, forces us to state whether it is 'ils' or 'elles'.

Of course, it may be quite easy in post-editing to settle such matters but the more ambiguity is left on various fronts the less acceptable the output will be. On the basis of the points I have just sketched, we can therefore divide systems between those that can capture the translation of propositional content on a sentence internal basis only and those which, at least in a number of areas, can access discourse information to determine the meaning of various lexical and phrasal units.

Thematic information

By thematic information here I shall be referring to the way that each utterance is organized as a message in terms of topic-comment or theme-rheme in Hallidayan terminology (hence the term 'thematic' in the use adopted here). Thematic structure is closely related to the organisation of each message as a piece of information transfer (sometimes referred to as given vs. new information) and, more generally, it is part of the textual function of language. A passive, to take the most salient example of thematic information, is not simply equivalent to an active although in many cases active and passive sentences have the same truth-value.

In attempting to characterize thematic information, we would work from families of sentences such as the one below which involve actives, passives, cleft sentences, topicalized sentences, etc:

(5) (a) The Government rejected the proposal
(b) The proposal was rejected by the Government
(c) It was the Government that rejected the proposal
(d) It was the proposal that the Government rejected
(e) It was the proposal that was rejected by the Government

A number of translation routines can indubitably be based on sentence information alone with reasonable accuracy. But, here again, there is no doubt that much work remains to be done in exploring equivalencies between corresponding constructions within various languages: e.g. short passives, impersonal passives, 'reflexive' constructions, 'one' constructions and the like. As for the contrasive study of the highlighting of various elements according to the co-text and the context, it is still in its infancy (but see M.P. Woodley, 1991 as an interesting study of the differences between passives in English and French, including discussion of Fr. 'on' vs. the English passive).

Pragmatic interpretation

The theory of pragmatics variously defined as 'the relation of signs to their interpreters' (Morris, 1938) or 'the study of linguistic acts and the contexts in which they are performed' (Stalnaker, 1972) is a vast and growing area of research. Here, I shall only point out that reasonably quality translation has often been argued to require the calculation of what speech act is being performed. Are we dealing with a statement, a command, a request, a promise, a warning, etc.? Earlier on it was pointed out that, for instance, in translation from English to French it is often more appropriate to use an infinitive instead of an imperative:

(6) (a) Depressurize hydraulic system
(b) Dépressuriser le système hydraulique.

Although this was presented as an example of stylistic equivalence earlier, it is more accurate to describe it as a case of speech act equivalence. Clearly, the study of pragmatics, which has been on the centre stage of linguistic theorising in recent years, does not limit oneself to speech acts. It often encompasses presuppositions, implicatures, aspects of discourse structure, or even the study of all the effects which can be derived from utterances in context. Much of this is relevant to translation but unfortunately the discussion is usually restricted to general principles and does not pretend to offer detailed strategies for dealing with individual speech act. This is an area much trodden by Artificial Intelligence specialists and no ambitious

MT system could ignore the pioneering work of AI specialists such as Wilks and Schank in this domain.

Style

The last area to be covered is style. All authors who write on style stress the diversity of usage. The following quote is not untypical:

> 'Style is one of the thorniest concepts to be dealt with in this encyclopedia. To Samuel Wesley, it was "the dress of thought", to Jonathan Swift, it was "proper words in proper places"; to W B Yeats, it was "high breeding in words and in argument". And so we could continue, through several hundred definitions and characterizations. It is a remarkable career for a word that originally meant no more than a "writing-implement" – a pointed object, or *stilus*, for inscribing wax' (Crystal, 1988: 66)

It is not the case that all aspects of style are irretrievably subjective and teachers of translation are able to guide students in establishing stylistic equivalencies between languages (see Vinay and Darbelnet, 1958: 201-219 *et passim* for a particularly interesting example). Nevertheless it has to be admitted that in many areas we are dealing with simple preferences and that it is not clear how their combination can be formalized. What is perhaps worth pointing out in this context is that if we are able to recover the propositional content of an utterance and to determine various aspects of its thematic orientation and its pragmatic value, we will go a long way towards capturing important aspects of style.

Error analysis

Discussions of quality frequently engender the impression that one is dealing with rather subjective matters and the above paragraph on style may have convinced the reader that quality just lies in the eyes of the beholder. A solution to the problem of evaluation is often argued to lie in the analysis of errors. Error counting looks like an objective way of evaluating a system. The problem here is that unless we are provided with a classification of errors – i.e. a classification related to what should be achieved – we are likely to be faced with a rather atomistic, piecemeal account of the performance of a translation system. For instance, we are often told when a new MT system is presented

are indeed not part of the dictionary as we would all accept that dictionaries have to be constantly updated. But what strikes me as a linguist interested in the evaluation of the system – on the assumption that the same type of response is provided for a number of other compounds – is that the system in question appears to have no strategy for the translation of compounds. Compounding, in Germanic languages, is highly productive. A simple test of this productivity is the following observation: if we list all the noun-noun compounds in a given text reverse them (e.g. *water-pressure* → *pressure-water*), it is always possible to find an interpretation for each new compound given appropriate contextual conditions. What has to be appreciated is that compounding in languages like English allows the generation of an infinite set of new words (cf. *manager, floor manager, factory floor manager, steel factory floor manager*, etc.). It is not an accident that the famous Canadian project Taum-Aviation, after the success of its immediate predecessor Taum-meteo, failed in large part because of an inability to handle the long nominal compounds characteristic of aviation vocabulary.

What I am therefore arguing is that, in assessing an MT system and trying to analyze errors, we need a great deal of appreciation of the linguistic potentialities of the languages under consideration. Broadly speaking, we can divide the structures we come across into a two by two matrix of the following kind

	WORD LEVEL	SENTENCE LEVEL
FORM	morphology	syntax
MEANING	lexical semantics	grammatical semantics

From the point of view of morphology, systems to be tested need to be able to cope with inflection, derivation and compounding. Inflection has to do with grammatically determined variants of lexical units: e.g. plural (*cats*), tense endings (*worked*), etc. By and large, all modern MT systems, incorporate subroutines for recognizing inflections. Where systems are far less adequate is in dealing with derivation (the production of new lexical units from bases, cf. *regular, regularize, regularization, de-regularization* etc.) and with compounding (the production of new lexical units from words, cf. *machine code, machine code analysis, machine code computer analysis*, etc.). It is important simple example the structure of the so-called Auxiliary in English is well encapsulated in formulae such as the following (see Chomsky, 1957, 1965; and Gazdar et al. 1985, for a more detailed formalization):

(9) Auxiliary → Tense (Modal)(Perfect) (Progressive)
Tense → {Present, Past}
Modal → {may, will,...,can}
Perfect → have + past participle
Progressive → be + present participle

The rules of (9) account for verbal structure ranging from *The computer exploded* to *The computer may have been working*. Given that corresponding formulae for verbal structures are available for other languages, it is surprising that many commercial systems still fail to translate sentences which incorporate fairly straightforward verbal complexes.

But correct sequencing is far too general a requirement. The kind of areas we should pay attention to are all the processes which allow structures to be mapped into other structures: control (*The Government expects to revoke the treaty*), raising (*The Government seems to be in trouble*), relativisation (*The committee which supports this proposal*), subordination (*They realized that it was impossible*), etc. In other words, making sure that the recursive backbone of sentence structure is handled by an MT system is crucial for an understanding of its potentialities.

If we now turn to meaning, we can distinguish lexical semantics from grammatical semantics. As I mentioned earlier, one of the major difficulties in MT is lexical disambiguation (cf. the old chestnut of *bank*1 financial institution vs. *bank2* side of a river). A typical strategy for lexical disambiguation involves the use of lexical semantic features in defining words (e.g. ±artefact, ±human, ±animate, etc.). What many commercial systems mean when they advertise the inclusion of Artificial Intelligence in their programmes is simply the incorporation of a number of lexical semantic features in the specification of content words. In assessing a system it is important to know what kind of feature grid is used, how the features are defined, what tools are available for linking features to the co-text, etc.

Finally, we turn to grammatical semantics. Here we have in mind areas such as determination and quantification (e.g. *the/all reports*), mood (e.g. *Open the meeting vs. They opened the meeting*), modality (e.g. *They might/could/should* open the meeting) or tense and aspect (They *had opened* the meeting). There seems little doubt that a proper translation of these areas cannot really be morphosyntactic (or, surfacy, if you prefer). Unless the MT system integrates semantic refinements, translations are likely to be of extremely poor quality.

The above paragraphs are in a sense no more than headings pointing us in a variety of directions (see Allegreanza et al., 1991, and Durand et al., 1991, for more extensive description of the areas sketched here within a transfer approach). My aim, though, was to emphasize that much is known about linguistic structure which can be cast in a fairly neutral way and can be used to evaluate a system. In addition to monolingual adequacy we need, of course, some account of equivalence between various areas of linguistic structure. But it does not seem so far-fetched to expect of the documentation accompanying an MT system that is should specify what range of structures are covered. In the same way as manuals for various types of software often offer a description for the layman followed by a technical description for the programmer/developer, it would be nice to be told what kinds of structures are covered in an MT system. To my knowledge, the leaflets and manuals on the market are sadly deficient in this respect.

Sublanguages

I am all too aware that the linguistic dimensions I have outlined as relevant to an evaluation of MT systems have, on the whole, been exemplified here with ordinary language data. Many specialists claim, with some plausibility, that by devising systems based on 'sublanguages' or 'restricted' languages, the task of MT becomes tractable and has a fair chance of success. By sublanguages is usually meant sets of texts which deal with one field only, and hence have a specialized vocabulary or terminology, and a syntax exhibiting a much narrower range of constructions than general purpose language. Examples taken from Kittredge (1988: 60-62) are weather bulletins or aircraft maintenance manuals as respectively typified below:

(10) Weather bulletin

FORECAST FOR YUKON AND NORTHWESTER NBC
ISSUED BY ENVIRONMENT CANADA AT 5:30 AM PDT
FRIDAY JULY 11 1980 FOR TODAY AND SATURDAY
KLONDIKE
BEAVER CREEK
STEWART RIVER
RAIN OCCASIONALLY MIXED WITH SLEET TODAY
CHANGING TO SNOW THIS EVENING. HIGHS 2 TO 4.
WINDS INCREASING TO STRONG NORTHWESTERLY
THIS AFTERNOON. CLOUDY WITH A FEW SHOWERS
SATURDAY. HIGHS NEAR 6.

(11) Aircraft maintenance manual

REMOVAL AND INSTALLATION OF PRESSURE SWITCH - NO. 1 SYSTEM
Removal procedure:
(a) Depressurize hydraulic system
(b) Disconnect electrical connector on pressure switch
(c) Disconnect line at pressure port
(d) Disconnect line at drain port elbow
(e) Loosen the two mounting bolts and remove switch.

In the same article, Kittredge (1988) defines a sublanguage as any subsystem of a language with the following properties:

(i) the language subsystem is used in reference to a particular domain of discourse, or family of related domains,

(ii) the sets of sentences and texts in the language subsystem reflects the usage of some 'community' of speakers, who are normally linked by some common knowledge about the domain (facts, assumptions, etc.) which goes beyond the common knowledge of speakers of the standard language,

(iii) the subsystem has all the 'essential' properties of a linguistic system, such as 'consistency', 'completeness', 'economy of expression', and so forth,

(iv) the language subsystem is maximal with respect to the domain, in the mathematical sense that no larger domain has the same properties.

The first two clauses of this definition do seem to me to correspond to our intuitive, pre-theoretical definition of what a sublanguage is. The last two clauses, however, move towards a formal characterization of a sublanguage treating it as closed under a certain set of operations. It is reminiscent of the definition of simple formal structures such as groups in mathematics illustrated by clock arithmetic. But do sublanguages behave in line with clauses (iii) and (iv)? One general point about formal systems is that the notions of *completeness* (derive all and only the correct sentences or formulae) and *consistency* (do not derive a contradiction) are very hard to demonstrate. Thus, in the classical work of the logician and mathematician Kurt Godel in the 1930s, there are claims of incompleteness even with respect to well-understood systems such as number theory or propositional logic (cf. Godel, 1931; and for more readable accounts see Nagel and Newman, 1958; Regis, 1987: ch. 3). All this is to say, that I find the analogy between sublanguages and closed, formal languages (which are, by definition, regimented) rather misleading.

My own experience of working with terminologists within the Eurotra project has convinced me that dealing with texts in restricted domains (e.g. satellite telecommunications) reduces the problem of ambiguity but by no means solves it. As Jennifer Pearson of Dublin City University recently reminded me, many texts which would unhesitatingly be described as prototypical examples of sublanguages show that ordinary language grammar and vocabulary is intermixed with the more restricted syntax and terminology characterizing the sublanguage in question. Nor is it the case that the vocabulary of sublanguages can generally be treated as closed, and hence amenable to simple listing. In many languages compounding and derivations processes, as pointed out earlier, allow the production of an indefinitely large set of lexical units. And Taum-aviation is reported, among other things, to have floundered on the problem of complex compounding in the field of aerospace. Be that as it may, the extensibility of systems based on highly regimented sublanguages must be in doubt.

Conclusion

Let me move on to a few concluding remarks. I have emphasized in this paper the need for more sophisticated testing of the linguistic aspects of MT systems which are on the market. It could be objected that commercially available systems are not intended to deal with natural language in its full richness and complexity but are devised for restricted languages which the user must program in. Whether sublanguages can be sharply isolated from ordinary language is at least questionable. And, in any case, it will be noted that much of the publicity for commercial systems seems to be based on quite complex texts such as business letters or semi-scientific aspects of business MT systems, it is practically impossible to evaluate claims regarding their potential if properly used.

It is not my aim to knock commercial systems down. It is undeniably easier to talk about systems than to devise them and I have the greatest admiration for system-designers and developers. What I have tried to argue is that the evaluation of the linguistic capabilities of MT systems should not be done in a random and piecemeal way, as I often feel is the case in reading reviews of MT systems in either journals or magazines. Like scientific theories, all classifications and linguistic test suites are deficient in some respect or other. I have nevertheless tried to demonstrate that linguistic structures can be looked at from a variety of separable dimensions relevant to translation and that more awareness of such structures leads to a better understanding of what MT systems can and cannot do.

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Electronic Publishing: CAB International's strategy for the 1990s

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Introduction

CAB International is an unusual, if not unique, organization, and its special status needs to be understood as background to this paper. CABI is an international, intergovernmental, non-profit organization which is 'owned' by its 29 member governments. These are principally countries which belong, or at one time belonged, to the British Commonwealth, and CABI had its origins as the Commonwealth Agricultural Bureaux. The organization gained international status in 1988, and is now open to membership by all nations. The newest Member, Hungary, is the first non-Commonwealth state to join CABI.

CABI exists to provide services to agricultural research internationally, in the fields of information, taxonomy and biological control. By virtue of its origins and its present membership, it has a special mission to serve scientists and the agricultural community in developing countries. On the scientific side, this is done through the identification services provided by the taxonomic institutes, and the execution of biological control programmes funded in the main by the international development agencies.

On the information side, the CAB Abstracts database and the publications derived from it represent a key reference source to international agricultural research. These are widely used throughout the developed world, but less so in developing countries. There is a great need to improve the dissemination of information to scientists in the developing world, and modern information technology provides the opportunity to cut across the traditional barriers of costs and poor communications.

At the same time, CABI receives no government subsidies, and relies heavily on the sales of its information products to support its scientific and information activities. This presents the need to develop and maintain successful markets for these products and to continue to develop and diversify the range of products to satisfy user demands. It is also necessary to continually monitor, and if possible reduce the costs of production of the database, in order to contain the costs of a process which is expensive because of the scientific expertise applied to abstracting and indexing. On both of these counts information technology is intrinsically important to CABI and to the worldwide users of its services.

The IT strategy, then, is fundamental to CABI's viability. If it is successful it will result in improved information transfer to the world agricultural research community, and will be particularly beneficial to scientists in developing countries.

Developments in information technology

The dramatic and continuing rate of growth of information technology has been well-documented and will not be addressed here in any systematic way. We will, however, illustrate the significance of this growth by example and relate to the specific case of the use of IT by research scientists. Later in this paper we will return to the precept that developments in IT allow information to be delivered direct to end-users (in our case, scientists), reducing dependence on information intermediaries, and the example demonstrates the extent to which this has been made possible by developments in IT.

Research scientists, wherever they happen to work, have the same fundamental requirements for access to information and data, for the management and manipulation of scientific data, for the means of describing and disseminating the results of their work, and for communication with other scientists working in the same discipline. Clearly there is wide variation in the degree to which scientists have access to these facilities and the extremes are worlds apart. Developments in information technology over the past twenty years, have presented the opportunity, at least in technical terms, of bridging the gap and the pace of development is likely to continue.

To illustrate the significance of this development we can look at two extremes, comparing the change in just two decades.

In 1971, a research scientist working at a very well endowed Institute in a developed country would be entirely dependent for published research information on the collections of, and resources available through his Institute library. Further, he would only have recourse to printed materials (or at best, microfilm), in the form of primary publications and secondary indexes. The task, for example, of carrying out a literature survey even in a specialist discipline would be extremely time-consuming and very imperfect.

For the purposes of processing experimental data or compiling statistics, he might have access to an institutional mainframe computer which would have limited power, would be slow, and would probably be difficult to use – in each of these characteristics, we infer by comparison with modern systems. The computer software available would be very restricted in capability, and the scientist may even need to write his own software or call on the Institute's computing staff to prepare customized software to satisfy his requirements.

He would probably have to write his research papers in longhand, or at best in rough form on a typewriter and then rely on another person to prepare the final form, the process including a number of time-consuming and expensive correction cycles.

Communication with other scientists, particularly those in other areas or at remote sites, would be limited to mail or telephone contact and infrequent attendance at conferences and seminars.

At the other extreme, the scientist in a poor Institute in a developing country in 1971 would have virtually no library facilities, certainly no access to computers, very rudimentary facilities for publishing, and almost no possibility of communicating with other scientists outside his immediate region. Further, other than through massive injections of funding, he would have no prospect of improving this situation.

Twenty years later, in 1991, the 'rich' scientist will have at his disposal, through international communications and online services, access to a vast store of information in virtually every area of scientific or commercial relevance to his work. He will also have, on his desk, one or more CD-ROM databases of the highest relevance to his discipline. He will have, also on his desk for his personal use, a computer workstation with the power to carry out any data processing and analysis other than that which might require the use of 'super computers'. This will include powerful software which he will be able to tailor for his specific requirements without the need for expertise in computer programming.

The system will also provide him with facilities for preparing his research papers to a very high publishing standard, and printing these on a laser printer or transmitting them direct to publishers by telecommunications or on a magnetic disc.

His computer will be connected to national and international telecommunication networks to allow him to communicate via electronic mail and teleconferencing with his colleagues virtually anywhere in the world.

This scenario is by no means fanciful: it can already be seen in many scientific research institutions and we are not very far from the time when such facilities will be regarded as standard 'tools of the trade' for research scientists.

The remarkable difference between the environment of 1971 and that of 1991 is that virtually all of these resources can be provided to and used by, scientists anywhere in the world. Leaving aside the question of cost for a moment it is technically possible for the developing country scientist to have facilities comparable with his peers in the developed world. The major exception is that many developing countries are still poorly served by telecommunications, and where they are available the costs of use may be prohibitive.

Of course, the costs of equipment, software and the information resources are significant factors but these costs continue to decrease and the 'entry level' can be relatively low. Although it is unlikely that any scientists in developing countries would at present have anything approaching the kind of capability described here, there is no doubt that the use of microcomputers is spreading very rapidly and there is already a substantial base of equipment and experience from which the enhanced facilities can be developed.

For the purposes of this paper, we will address those aspects of information technology which are specifically relevant to the storage and retrieval of scientific information.

The underlying technology is the *microcomputer* (or personal computer, or PC). The pace of development of the PC has probably been unparalleled by any other technology, and there are few areas of need for the use of computing which cannot now be satisfied by the use of PCs. In fact, with the development of more powerful processors, very high volume storage devices and the advent of microcomputer networking, it is quite conceivable (if not probable) that all other forms of computing will become obsolescent other than those requiring so-called 'super computing' capabilities – such as very complex mathematical modelling, meteorological data processing, and so on.

This will be significant to the concept of providing access to large information databases, such as the scientific bibliographic databases. Access to these in the past has been restricted to those institutes which could afford the high capital costs of acquiring and maintaining mini- or mainframe computer systems and very specialized software. It is now feasible for smaller organizations to provide information services using microcomputer networks and low-cost software systems at a fraction of the cost which would previously have applied. Further, we can expect to see a new generation of delivery mechanisms for very large databases such that, for example, a whole database such as CAB Abstracts could be supplied as a 'black box' with software, and simply plugged in to a PC network for institutional use with none of the complexity (or cost) of large computer maintenance support.

At another level, CD-ROM is now well-established as a delivery mechanism for databases for personal use on individual PCs and through networks. The growth in the availability and use of CD-ROM databases has been explosive, led principally by the producers of bibliographic databases. Each disc can store 600 megabytes (million characters) of information representing, in the case of the CAB Abstracts database, the abstracts produced over three years – some 400,000. The technology is stable, reliable and affordable, and the retrieval software supplied with CD-ROM databases is extremely simple to learn and to use, requiring no special computer expertise and no more than a rudimentary understanding of the principals of information searching.

One of the component developments of microcomputer systems has been the increasing power and sophistication of *display technology*. High-resolution colour screens, for example, are now available at reasonable cost. When coupled with storage devices such as high-volume magnetic discs and CD-ROM this development has opened the way to the management and presentation of multimedia databases comprising text, graphics, colour images, video and sound.

Microcomputer software has necessarily kept pace with the development of the hardware in the sense that many or most of the functions previously possible only on large computers can now be made available on PCs. In fact it can be said that microcomputer software has outstripped the comparable larger systems by using the special capabilities of PCs and (importantly) reflecting the expectations of a new generation of computer users for 'friendly' and visually attractive systems. As mentioned earlier, PC-based information retrieval software, for example, is far more simple to use and in some ways more powerful than the large system equivalents. Another important development has been the introduction of Graphic User Interfaces where the user operates principally through the use of a hand-held 'mouse' and controls the software through on-screen 'icons' or symbols. One of the most significant developments in this context has been the emergence of 'Windows' software, originating on Macintosh computers and latterly becoming available for PCs.

In another software area, expert systems have also developed rapidly for PCs in recent years, and are being used extensively in all areas of science and commerce. At the simplest level, an expert system can be considered as a device which can carry out complex decision-making processes by reference to a stored and structured body of knowledge, that is, emulating the analytical process of an expert. Computer-based expert systems provide the facilities for constructing the knowledge base, defining rules for traversing the knowledge base, and developing the communication interface with the user. The user will normally interact with the system through a dynamic question and answer process which applies the user's answers to the rules and arrives at a diagnosis or solution to the problem. Again, in the case of PC systems these systems can incorporate aids to the diagnosis, such as graphics and colour images.

The publishing process has been altered dramatically by the use of information technology, both in terms of the production processing for newspapers, books and periodicals and, at the other extreme, in relation to the preparation by individuals of material for publication. Modern wordprocessing software, and more recently desktop publishing systems, coupled with the emergence of laser printers, have provided the PC user with the capability to produce publications of very high quality. This is of particular significance to developing countries, many of which have for cost reasons been unable to produce publications at a standard comparable to those of developed countries. The ability to transmit manuscripts to publishers in machine-readable form is also becoming important, in terms of reducing costs and minimizing errors.

Regardless of other trends, it is clear that the PC will continue to proliferate in number and in the extent of its usage worldwide, and will become an essential tool of the scientist. It will consequently provide a major new opportunity area for publishers like CABI. Coupled with technologies such as CD-ROM, laser printers, graphics software, and so on, the PC also presents the capability for a major breakthrough in the transfer of information of all kinds, with no barriers to use other than cost, And the costs are decreasing rapidly.

Information delivery trends

While it is clear that the technological capability exists for the dissemination of information in electronic form, the needs and expectations of users are not yet well understood, and publishers like CABI inevitably have to make judgements based on limited data.

We will, however, in this section present our view of trends in the usage of electronic information in our area of interest – agricultural research and related disciplines. Underlying all of this is an important fact which needs to be recognized, and that is that information resources such as those produced by CABI are used by only a relatively small proportion of the total potential audience. This is true taking into account all distribution media, both print and electronic. The significance of the developments in IT is that information can and will become much more widely used. That is, while there may be some change in the patterns of use, and declines in usage in some areas, the overall effect will be a substantial increase in the accessibility and use of information resources.

It is also important to recognize that the new generations of scientists will be 'computer-literate' and will expect and demand to have access to computers, both for their scientific work and as the tools for accessing information.

Commercial online services

Online will remain important as the mechanism for accessing very large databases, and for those users requiring access to databases in a number of disciplines. Usage will continue to grow at a modest rate but will continue to be predominantly from the developed world. Problems of communications and costs will continue to limit availability in developing countries, and there are unlikely to be any breakthroughs in either communications or costs which will significantly reduce the problem for the poorer countries.

While there will be some improvements in user interfaces, through the use of intelligent gateways, advanced retrieval software, and high-speed communications, online services will continue to be less powerful and 'user friendly' than modern PC systems. To some extent, this will perpetuate the need for the use of specialist intermediaries to carry out searches, and there is unlikely to be a significant increase in the use of these services by end-users.

Institutional database services: online and SDI

In our field there is limited use of the major databases on institutional computers for providing online or SDI services. The costs of supplying and maintaining these services are high, and they are subject to many of the limitations described above in relation to commercial online services.

We see little prospect of change from the 'traditional' mode of operation which generally involves the use of mainframe or large mini computers, together with software which is either a commercial product or a locally-developed system. In both cases the costs of maintenance will be high and the software will very probably be obsolete by comparison with modern PC-based systems.

On the other hand, we see the potential for significant growth through the use of modern high-performance microcomputers, together with special hardware/software packages enabling access to very large databases without the traditional overheads associated with the maintenance of the databases and software. Some suppliers are already supplying such packages as a spin-off from developments in CD-ROM technology, and it is apparent that this kind of capability, which has formerly been available only to large institutions, can now be provided in a cost-effective way to small and medium-sized organizations.

Electronic journals

One of the immediate opportunities presented by the growth in use of PCs by scientists is that of providing scientific publications (both primary and secondary) in electronic form (as floppy discs), together with information retrieval software. The extent of demand for this medium is not yet known: we anticipate it will be small initially, but will grow steadily. Information presented in this way will have to be compatible, or be able to be made compatible, with the many microcomputer database management packages available for PCs, and particularly the leading ones such as Micro CDS-ISIS, Cardbox, ProCite, and so on.

CD-ROM

Finally in this brief survey of trends in information delivery we arrive at CD-ROM, which we believe will prove to be the most important medium in this area for the foreseeable future.

The technology is now well-established, stable, subject to international standards, and becoming continually cheaper and more powerful. The rate of growth in the sales of CD-ROM equipment has been, and continues to be, dramatic, and is paralleled by the growth in the number of databases and software products. While other storage technologies will emerge, both optical and magnetic, CD-ROM has developed such a large user base that it must now be soundly established for at least the next 10 years, and any future technology which is to be competitive will have to be extraordinarily cheap such that the transition from CD-ROM can be easily made by both users and publishers.

For CABI, and no doubt for similar publishers, CD-ROM clearly represents the major strategic thrust for the 1990s, and it is particularly important to CABI, given the organization's special remit to serve developing countries. CD-ROM unquestionably represents a breakthrough in the task of delivering information to scientists in the developing world.

CABI as a publisher

The task for CABI is to evaluate all of these technologies and trends, and to assess the opportunities they present to improve production methods and the quality of existing products, to develop new media for the distribution of existing products, and most importantly, to develop new products. The strategy, then, has to be directed at all of these aspects and it must be consistent with CABI's role as a publisher and the consequent financial implications.

As we indicated earlier, CABI relies principally on the sales of information products derived from the CAB Abstracts database to support its operations, and receives no subsidies of any kind. Within that framework, the major part of the income is at present earned through sales of the 45 printed Abstracts journals, and royalties from online use of the database through commercial vendors. Consequently, new electronic products can represent 'competition' for these existing products, with a risk to CABI's traditional income base.

In the long term it is possible that the electronic publishing programme will grow rapidly and to the extent that the income base is spread more evenly across a number of products. In the mean time, it is necessary to control the transition such that financial viability is not threatened, and this is effected by adopting a pricing policy which provides an element of protection for the traditional products. This problem is a common one for secondary publishers making the move into electronic products in general, and CD-ROM in particular, and all face the same difficult decision concerning the pricing policy.

CABI strategy

The strategy we adopt in CABI consequently has to take into account all of these factors: to satisfy the growth in demand for electronic publications, to exploit the opportunities offered by new technology, and at the same time to manage the transition from the traditional products to the new.

The *scope* will be extended by adding selectively to the database; abstracts from the archival print journals date back as far as 1912 in some subject disciplines. The extent to which the older material is added to the database will be determined by a combination of scientific and economic criteria. The first three databases to be published in the CAB SPECTRUM series illustrate this point.

VETCD and BEASTCD will both include abstracts published from 1973 to the present date (of the order of 350,000 in each case). This kind of time span is considered to be valid in terms of the 'half life' of publications in these areas of science. On the other hand, the third database, TREECD, will include all abstracts published in forestry since the inception of 'Forestry Abstracts' in 1939. That is, the complete collection of CABI abstracts in this discipline, again totalling 350,000 for this 50-year period.

Further products are planned, as shown in the following table which also indicates the planned time span:

Horticulture	1934 on
Crop Protection	1912 on
Soil Science	1934 on
Plant Genetic Resources	1977 on

The production of these databases from printed abstracts is a costly exercise, although CABI has established an effective operational environment for conversion of the data by digital scanning and optical character recognition (OCR). Even so, the capital costs of equipment are high, and the process involves a substantial degree of editorial control in order to maintain the high editorial standards we set out to achieve for the CAB Abstracts database.

Consequently the CAB Spectrum programme is ambitious and its execution will require financing from external sponsors in addition to CABI's own contribution from sales of the products. The development of the TREE CD, for example, has been generously funded by the UK Overseas Development Administration. The ODA has recognized the significance of this development in providing a uniquely valuable information resource for developing countries in the disciplines of Forestry, Agroforestry and Forest Products research. These are all of major economic significance in many countries.

We clearly see CD-ROM as a major medium for distribution of our information. It provides the capability to serve a wide range of users, and in particular opens the way to products which are applicable to end-users and to developing countries. It is not, however, the best or more appropriate form for all kinds of use, and we will be introducing new products in other media, with the objective of providing a range of options for users ranging from individuals, through small institutes to large organizations or networks.

The first of these is the so-called *Electronic Journal*, All of the CAB Abstracts journals are now being made available on floppy disc in a range of formats for use with PC-based information management and retrieval software. For the present these include Micro CDS/ISIS, ProCite, and the common 'comma-delimited' format which is a de facto standard for many database management systems. We are also considering the options for supplying software with the data, although it is by no means clear what kind of software users will require. The *Electronic Journal* is directed specifically at end-users – the scientists themselves – rather than librarians or other information intermediaries, and one important role for this product is to provide a current-awareness option for CD-ROM users. As the use of CD-ROM expands, we anticipate a corresponding increase in the usage and awareness of information services by end-users, and a consequent demand for PC-based current awareness services.

The next level of usage is in the context of organizational or network environments. There have to date been only limited options for these users, based on providing services from the database (or selected segments of it) supplied on magnetic tape. The cost of acquiring the tapes is relatively high, but the more significant costs relate to the establishment and maintenance of mini- or mainframe hardware and software systems needed to provide services from the tapes. These costs have commonly been beyond the reach of most organizations, and the systems are prone to becoming outdated by comparison with modern PC information retrieval software such as that used for CD-ROM systems.

The approach we are taking to this problem in the future will involve a combination of strategies. At the one extreme this will include pricing strategies to provide concessions for educational institutions, and the introduction of new data formats which will replace the 'traditional' and complex formats which have required users to invest in software development for data conversion. This approach will open up access to a new class of institutional user, but will not resolve the problems mentioned earlier, of costs and software capabilities. The solution will be in a new generation of packaged systems comprising hardware, software and the database, designed to be 'plug-compatible' with PC networks which conform with industry standards. The concept is that the systems can be added in to existing PC networks as modules, providing access to very large databases through modern software operating in a client/server architecture. This will bring the advantages of modern software packaged with the database, both being effectively maintenance-free, together with a storage device which can be as small or as large as is necessary, and may range from small hard disc drives, through CD-ROM to magnetic or optical disc systems capable of supporting gigabytes of data. The first of these package systems are starting to appear from a number of suppliers, and we believe they will represent the most significant development for many years in relation to in-house information retrieval services for large databases.

Finally, CABI will be making an important move into the integration of the CAB Abstracts bibliographic database with factual scientific databases or data collections of varying kinds. In certain disciplines CABI is uniquely-placed in terms of the information resources and scientific expertise available to it. The concept is to bring these resources together using information technology, in order to provide new and comprehensive sources of information and data.

One such discipline is that of Pest Management, where CABI has special resources and capabilities, and the strategy can be illustrated by reference to a planned development in this area. This is to produce a multimedia database 'Compendium' comprising a number of databases (probably but not necessarily stored on CD-ROM) linked and accessible through hypermedia technology. The 'core' is a full text database comprising detailed scientific descriptions of a number (several thousand) of pests and diseases of crops of economic significance worldwide. These descriptions will be compiled by scientists expert in the study of these pests and diseases which could include insects, fungi, weeds, parasites, and other organisms.

Associated with this core database will be: a comprehensive bibliographic database for these organisms, selected from CAB Abstracts; data defining the known worldwide geographic distribution of the pest, and able to be represented in the form of global or regional maps; illustrations, including line drawings and colour pictures, digitized for computer storage and presentation on graphics screens; reference databases providing such details as natural enemies, biological control measures, taxonomic authority files, and so on. The Compendium would thus represent a unique factual resource which could in fact only be produced and maintained using information technology. It also presents the opportunity to enhance the factual data further through the use of specialized PC software, for example to assist in the identification of pests, and (importantly) to utilize the factual data to perform predictive modelling of the potential spread of pests taking into account geographic and climatic factors. This we see as the next generation of information delivery, where the power of the PC and associated technology provides for the first time the opportunity to cut across the traditional boundary between research information, as represented by bibliographic databases, and the huge store of factual data in the various forms of text, graphics, and techniques for modelling and analysis.

This concept, and the enormous growth in the worldwide use of CD-ROM, will be the two major platforms for CABI's future development of electronic products and services for the world agricultural community.

Management of visual resources in the Hong Kong Polytechnic Library: The case of the slide collection

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Abstract

The Hong Kong Polytechnic Library houses the largest slide collection amongst academic libraries in Hong Kong. Its present holdings exceed 160,000 slides and they are intensively used by both staff and students from the Swire School of Design and the Institute of Textiles & Clothing, who are vigorously looking for visual information.

This paper will document the development of the slide collection in the Hong Kong Polytechnic Library. Discussion will cover: physical set-up of the collection and equipment used, collection development, application of microcomputers in slide processing and cataloguing with the Library's main system. To better meet the users' need, a project of transferring 40,000 slide images onto a videodisc has been started.

The Hong Kong Polytechnic

The Hong Kong Polytechnic, established in 1972, is the largest tertiary educational institution in the territory. It is funded by the Hong Kong Government through the University and Polytechnic Grants Committee. For the academic year 1991/2, the number of full-time academic staff is close to 1,000 while the student population comprises 10,000 full-time and 16,000 part-time students.

Currently, there are 25 teaching departments/units offering more than 200 courses. These courses cover a wide range of professional and technical studies, from the higher certificate level to the Doctor of Philosophy degree. All courses are accredited by the Council for National Academic Awards (Great Britain). They are designed to serve the community's need for graduates who are able and ready for employment in industry, commerce and the various professions. The Polytechnic is now ambitiously planning for restructuring its curriculum so that by the mid-1990s, 65% of its courses will be at degree level.

The Hong Kong Polytechnic Library

The polytechnic library is a central supportive department of the institution. Working closely with the academic departments, the library acquires and avails materials from all over the world that are relevant for academic purpose. It has one of the largest collections in scientific, engineering, and business information in Asia. Other areas of strength are information technology, computer science, arts and design. Its present collection of approximately 750,000 items is growing at a rate of over 30,000 volumes per year.

In recent years, there has been a growing trend for local industries to be transformed into 'high-tech' ones. It implies that the tertiary educational institutions should support industrial needs by taking a more active role in research and development activities. As polytechnic staff are actively engaging in research work, the library not only acquires more expensive research resources, but also absorbs the costs in providing online searches and interlibrary loans to research staff. An Associate Librarian is specially appointed for academic liaison. Moreover, academic staff and higher degree students of other tertiary institutions can get access to the rich collection of the polytechnic library. The library is also keen on serving the local business and industrial communities by offering them fee-based services in interlibrary loans and online searches. Some of them are granted special borrowers' privileges.

The media services section

Acknowledging the fact that textual data may not be the most effective medium to communicate knowledge to users and more information becomes available in formats other than printed books and journals, the library started a non-print section in 1978. At the beginning, the non-print section was working closely with other sections because it was only responsible for keeping and circulating all non-print resources while acquisition, cataloguing and material processing were the jobs of separate sections.

After a few years' operation, it was realized that the overall planning, budgeting, acquisition, cataloguing and processing of audiovisual resources should be grouped under the same section in order to achieve better management control and a greater degree of specialization. In 1985, the name of the section was changed to the Audiovisual Materials Section and the formerly scattered duties were grouped under a single roof.

In the past decade, it has been demonstrated that audiovisual materials have been important learning resources in the library. An amazing wealth of visual resources in the form of 10,000 videocassettes and 1,500 videodiscs have been collected.[1] These materials

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are heavily used by staff and students as shown from the huge number of loans in the previous years. This number amounted to more than 170,000 in 1990/1. In addition, more than 7,000 users came to use another important form of visual resources – slides.

Moving into the 1990s, librarians have a different understanding of non-print materials and audiovisual services. Certainly, information need not be found in a book. By the same token, it need not necessarily be stored in any item, e.g. a videocassette or a computer disk. Information can be directly transmitted through a public television station, from an online information network or even through satellite broadcast. When the Gulf War broke out, public televisions in the library were running all day. People were attracted by TV news and special announcements as upcoming events could have world-wide impact.

We believe that it is the librarian's job to arouse users' awareness on the various choices in accessing both textual and visual information and to convey these choices to them. In August 1991, the section was renamed the Media Services Section to reflect the dynamic nature of audiovisual services in the 1990s.

The slide collection

The Polytechnic Library Media Services Section has the largest slide collection among academic libraries in Hong Kong. It has more than 160,000 slides, mostly colour, covering a wide range of subjects. About ten years ago, slides accompanied with audio cassette tapes and instructional notes constituted a "multimedia" learning environment catering for management and technical training. Currently, the library houses slightly more than 2,000 slide sets.

Advancements in technology have integrated sound and visual media into video format. In the mid-1980s, more and more training video programs became available. These programs are acquired for viewing during class lectures and individually by students who may have missed their classes. Since then, videocassettes have replaced slide sets as the most popular format for instruction and training.

However, the number of slides continues to grow. Due to the utilization of visual resources by courses in clothing and design, the Media Services Section starts to collect slides which may not belong to a set. 'Single slides' of the same author, topic or theme are gathered into the same holder. Then, these holders are hung in file cabinets for browsing. Today, the number of single slides reaches 70,000.

Slides get most of their viewers from both staff and students of the Swire School of Design. The School offers five full-time degree courses in design: fashion design, graphic design, industrial design, interior design and photographic design. A new course, a Master of Arts degree in design, will be offered in 1992/3. In addition, students from other departments like the Institute of Textiles & Clothing are frequent users of the collection.

No one can deny that Hong Kong has experienced drastic changes in recent decades. Economic prosperity cannot be better exhibited in the changing urban faces and new architectures. Economic development not only brings improvement to the material aspects of people's lives, but also affects their mental and cultural attitudes. Exhibitions held at the Hong Kong Arts Centre reflect people's pluralistic outlook on life and search for alternative aesthetic values. This former 'cultural desert' is turning into an oasis.

In the Polytechnic Library, we are not just satisfied with what is readily available from our suppliers, but collect according to library users' interests. Beginning in 1987, the library recognized the need to document the changes mentioned above in the form of visual images. The post of photographer was established. Then, a photographer was employed and sent to take pictures of both old and new buildings, people from every walk of life, political demonstrations, arts exhibitions, special events and festivals. Documentary images are grouped into a Hong Kong Collection. The library strongly believes that these slide images will be valuable heritage to future generations when they are looking for historical information and inspiration from the past.

Physical set-up of the slide collection

The slide collection is housed in the Media Services Section on the third floor of the Library building. It is available for use except on Sundays. Any library user can access the collection and utilize the viewing equipment by requesting it at the Media Services Counter.

The slide collection occupies a total area of 100 sq. m., where 16 sq. m. belongs to the studio. There are approximately 160m of shelving space for the 2,000 slide sets. In addition, single slides are kept in transparent plastic holders and hung in file cabinets for ease of browsing; and there are altogether 108 drawers – enough for storing 100,000 slides. All slides are arranged according to the Library of Congress Classification Scheme. An OPAC (online public access catalogue) terminal, with printer attached, is available for users to search for the slides they want. Since the place is not intended to be a study room, only limited seating is provided for those users who actually use the visual resources in the collection.

The size of each slide is only 5 cm X 5 cm. Slides of such small size will easily get lost if they are frequently moved from one place to another. Therefore, all necessary viewing equipment is available inside the collection. There are two Kodak 265 audio-viewer projectors for viewing slides and listening to the accompanying cassette tapes. Images can be enlarged to 22 cm X 22 cm on screen. A simple pictorial guide shows how to operate these projectors.

To facilitate users to select single slides from the collection and arrange them in a presentation sequence, the Slide Collection is equipped with two large light boxes. One is in the form of a 144cm X 90cm table. The other is a slanting one. This year the Media Services Section acquired four Prooflite 560 professional viewers of standard colour temperature 5500K. These new 38cm X 40cm viewers can either be used as light boxes or provide stable background lighting for slide duplication.

A Fotovix film video processor and an editor are installed for viewing slides under different colour balance or zooming details. These pieces of equipment can also be used by staff who would like to arrange a video presentation of their private collection of slides during lectures or students who are going to make video presentation programs. The Fotovix film video processor and the editor are connected to a colour television and a videocassette player. Both positive and negative films can be shown on the television. The user can adjust the colour balance, enlarge part of an image and insert a pointer. If s/he is satisfied with the image, s/he can push the record button at the videocassette player and the image will be captured.

The studio is equipped with a Canon copy-stand and the necessary photographic and lighting equipment for simple in-house production work. In case a member of staff wants to obtain copies of colour slides for which we have the copyright, our photographer can reproduce for him. But films must be sent to an outside laboratory for developing. As a lot of films are used in location shooting and duplication, a small refrigerator is used to keep films at a low temperature. Audio equipment is installed for checking the quality of accompanying cassettes and making back-up copies. The studio is also equipped with a small slide mounting machine.

Staff establishment

In the Media Services Section, we have a small yet very dynamic team of library staff to handle all jobs relating to slides.

Media Services Librarian

The Head of the Media Services Section is responsible for the management of all audio-visual resources: videocassettes, videodiscs, slides, filmstrips, microfiches and microfilms, cassettes and compact discs, kits, computer discs, realia and all relating equipment. She formulates the overall collection development policy, oversees the budget allocation and manages both technical and clerical staff.

Slide Librarian

Reporting to the media services librarian, the slide librarian is a professional librarian responsible for the general administration of the slide collection, which includes collection development, cataloguing and supervision of subordinate staff. He will also answer reference enquiries and respond to users' needs. Being the library subject specialist for both the Swire School of Design and the Institute of Textiles & Clothing, he makes regular contact with their library liaison officers so as to provide assistance to their staff members.

Photographer

The photographer is responsible for all technical aspects of the slide collection. He checks the quality of newly received slides, remounts them if they are kept in non-durable paper slide mounts, makes back-up copies of accompanying cassettes and inserts auto-signal if required. He also gets regular photographic assignments at art exhibitions, fashion shows, etc. In addition, he gives advice on the acquisition of photographic and viewing equipment. He often demonstrates to and assists users in using the equipment.

Library Assistant

A library assistant is responsible for processing new slides, like printing and fixing slide labels, and reshelving used items. For promoting the use of visual images, a carousel of newly acquired slides is prepared for showing each week. She will also notify departments on recent exhibitions where our photographer has gone to take pictures.

Collection development

Philosophy

Collection development is the joint effort of the library and the academic staff. Polytechnic librarians, with their professional knowledge, are acting as subject specialists for one or more subject disciplines. The slide librarian is the library subject specialist for the Swire School of Design and the Institute of Textiles & Clothing, because staff and students of these two departments are the most frequent users of the collection. He may also represent the library in the course planning meetings of these two departments and report on the availability of teaching and research materials.

The heavy utilization of visual resources by the Swire School of Design and the Institute of Textiles & Clothing does not preclude other departments from using the slide collection. Slide sets and single slides will also be collected for the latter. For example, there are some very useful slide sets for instructional use for the Department of Diagnostic Sciences and the Department of Health Sciences.

New catalogues of audiovisual materials are sent to the departments' library liaison officers for circulation among their colleagues. Items which are regarded as useful for instructional purposes by academic staff will receive careful consideration. If budget permits, they will be immediately ordered. In case a staff wishes to preview items before making any decision, suppliers will be requested to lend the materials for evaluation for a couple of weeks.

Collection analysis

While the majority of colour slides centre on arts and design disciplines, there are slide sets focusing on management, science, technology and medical studies. A recent estimation on the percentage of slides in selected subjects done by the polytechnic librarian and the media services librarian shows the following distribution:

Subject	*Percentage*
Art in general	5
Painting	13
Drawing	7
Sculpture	13
Photography	3
Architecture, interior design	10
Product design	5
Fashion	16
Hong Kong (all aspects)	12
Others (management, engineering, medicine, science, etc.)[2]	16

Sources

Commercial suppliers

Although the price of commercially supplied slides is not too expensive, and average US$2 for each piece, a commercial supplier may reproduce a few hundred sets of slides from an original to satisfy all orders by its customers. Hence the slide quality is adversely affected. Therefore, if a large quantity of slides are to be bought from a new supplier, sample copies will be requested for examination by our photographer.

Our suppliers can always provide us with professional advice and reliable service. Both are important in maintaining long term successful business relations. For example, the library purchases 2,500 to 3,000 fashion slides of major international fashion designers each year. These slides are taken from various fashion shows held in Paris, Milan, New York, London and Tokyo. Representative designs of the season will be sent to us soon after the shows are finished.

Museums and art galleries

Undeniably, museums and art galleries preserve most of the human arts heritage. There, art works of renowned artists are properly preserved and displayed. Certainly, these famous art collections are useful for students of arts and design courses in aiding stimulation and insight.

Some famous museums have published their collections in slide format. These include the National Gallery (London) and the National Palace Museum (Taiwan). At the same time, some art galleries always reproduce exhibitions held. e.g. the Chartered Institute of British Architects Heinz Gallery and the Courtauld and ever-changing one. The Hong Kong Collection project was started four years ago. Today, more than 20,000 slides are in this collection. Our photographer has regular location shooting assignments twice a week. His shooting plan includes topics ranging from domestic architectures, historic sites and buildings, fashion and clothing, arts and craft, to festivals and local customs.

Our slide collection of local designers' and artists' works is unique among academic libraries in Hong Kong. The Hong Kong Arts Centre and the Hong Kong Institute for Promotion of Chinese Culture send us their lists of forthcoming events and grant us approval in taking pictures from their exhibitions. Furthermore, about 2,000 slides are taken from the internationally renowned Hong Kong Fashion Week each year. These slides are important sources of inspiration as well as essential documentaries of native arts and design.

Government offices

Since the Polytechnic is a relatively young institution, important images prior to the early 1980s are difficult to acquire. For example, images on buildings of the 19th century were not available in our collection a year before. These images are useful for illustrating the development of domestic architecture. Other topics of interest include old government posters, product designs and book illustrations, clothing and uniform, traditional trades etc.

With the support of the Photographic Library of the Government Information Services Department, the Public Records Office and the Museum of History, a few hundred black and white photographs were acquired. These valuable images reflect the different aspects of Hong Kong life in the 1970s and earlier.

Private collections

Slide librarians may easily overlook useful collections close at hand. Academic staff who teach art courses always rely on visual resources for instruction. Furthermore, some may be active practitioners of arts. For instance, the Head of the Swire School of Design, Mr David Meredith, held an exhibition of his photographic works in May 1991. His works represent reactions to the diverse patterns of lifestyles and landscapes encountered via visits to North Africa and South-east Asia. These private collections will be valuable for the Polytechnic Library.

Sometimes, we will request staff to donate their collections to the library or reproduce them in slides. Some staff even supply us scripts and additional information on their works. In the slide collection, record would be filed in several places which resulted in great wastage of human resources.

Information technology has changed the library scene. Both personal and mainframe computers are extensively used in today's library management. Electronic data stored in a computer can be easily updated and retrieved. Repetitive manual work can largely be eliminated in an automated library. Computers not only speed up library jobs but also improve the work quality.

Recommendation management

Formerly, library assistants would, firstly, check the availability of items recommended for purchase. If an item was already in the library or on order, the staff would be notified accordingly. Otherwise, the Media Services Librarian or the Slide Librarian would decide whether to purchase or not and inform the staff of the decision. All record keeping and filing jobs were done manually.

In order to manage recommendations in a more efficient way, the Media Services Section has developed a menu-driven computer program to handle recommendation from staff and for quotation requests recently. This program was written by three student assistants in dBASE IV, using its SQL feature. It can handle all jobs prior to placing a valid order through the Library's main system regardless of the material's format. Because information is managed by a personal computer, staff are regularly notified at which stages their recommendations are being processed and a statistical report on the recommendations made by each department will be generated at the end of the month. The system can also list the titles recommended by particular staff or handle all types of enquiries by format, publisher, author, title, and status.

Material processing

Typing the necessary information on a small self-adhesive label which fits on an individual piece of slide is extremely tedious work. By using a typewriter, an experienced typist can produce, at the most, only a few hundred of these small size labels in a day.

In November 1990, the Media Services Section employed two student assistants from the Department of Computing Studies to develop a computer program to print self-adhesive labels for slides by using dBASE III Plus. The program controls the ESC characters of the printer to generate very small size characters (Roman 15 CPI). Take the example of fashion slides. On each label, a call number, the designer's name, type of wear, place of the fashion show and season are given. This computer program requires us to type once and specify the quantity required. Hundreds of slide labels can be printed in only a few minutes. In this way, many typing hours are saved.

Ordering, cataloguing, OPAC and circulation

The library had been using an in-house developed system to handle cataloguing, OPAC and circulation routines since 1984. To enhance the library services, it has recently been replaced by a powerful and fully integrated library management system, the Data Research System (DRS). The present system is run on a VAX 6410 machine. It performs additional tasks like ordering and fund accounting. All types of materials including books, journals and audiovisual materials, can be ordered, catalogued and circulated through the same system.

The cataloguing module was implemented in 1989. Data conforms to the Library of Congress MARC format. Cataloguing is based on the Anglo-American Cataloguing Rules (2nd edition) supplemented by the USMARC Formats for Bibliographic and Authority Data. The slide librarian does the online cataloguing and data transfer so that item information is available immediately after the item is catalogued. Before the item gets appropriate processing, we will give a note in the record informing users the item is now being processed. If a user urgently need the slides, we can easily search for him by following the accession number on the processing shelves.

The most powerful and convenient feature for users is the capability of free text information retrieval, i.e. every single word in a record can be searched. For an artist's collection, the title of each work will be typed in the contents note. Therefore, a user can look for a particular piece of work by entering the title or even some keywords from the title. Words may even be truncated if he is not too sure. Authority control is also enhanced by maintaining an online authority file and the system's capability of running global replacement throughout the entire database.

Users can freely browse slides in the slide collection. If academic staff wish to check slides out of the library, they can do so. For students, they first get the endorsement of their teachers before they are allowed to take out slides. The DRS system handles circulation by reading the barcodes on the Polytechnic ID cards and on the slide sets. Since single slides are too small to stick on barcodes, users who borrow single slides are required to fill in request slips. These slips will be kept for record and statistics.

CD-ROM

Nowadays, CD-ROM is commonly used in libraries. More reference works, indexes and abstracts are becoming available in CD-ROM format. The library is committed heavily to using CD-ROM in information services for a few years. Library users welcome this new information technology for it permits very flexible retrieval of information. Useful references and article abstracts can be printed from attached printers.[3] The number of workstations at the CD-ROM Centre has grown to 14.

CD-ROM can also replace voluminous cataloguing aids and all data can be retrieved at the same terminal. Furthermore, data can be easily transferred from CD-ROM databases to the Library's main system. The management and cataloguing of audiovisual materials, including slides, are making use of several CD-ROM databases: AV Online (SilverPlatter), Bibliofile and A/V Access (Library Corporation), LC Subject

Headings and Name Authority (Cataloguing Distribution Service, Library of Congress).

AV Online facilitates collection development by locating appropriate items for acquisition. For example, the staff can search for all works of Picasso in slide format in the database. A/V Access and Bibliofile resemble each other in data structure. Useful records can be transferred from the CD-ROM database to the DRS system in less than 15 seconds per record. Then, the record is ready for further amendment. The hit rate for video tapes and sound recordings produced in the United States is as high as 70%. However, for slides and microforms, the hit rate leaves much to be desired. For the two CD-ROMs distributed by the Library of Congress, data can be easily transferred from the CD-ROM databases to the library main system for authority control purposes.

Image database on a videodisc

After more than ten years of development, the Hong Kong Polytechnic Library has established a sizable image collection, comprising slides mainly of architecture, painting, sculpture, fashion design, interior design, industrial design and product design. This visual resource is heavily used by both staff and students.

However, we must be aware of new developments in technology and see how they can be applied to a library. Are there any ways to further improve our services? What do users expect from us in this powerful electronic computing world?

To ensure that users have convenient access to the slides and in order to preserve them, the media services librarian and the slide librarian have been investigating alternative methods for accessing images in the library. Users would like to:

- have an efficient method to search for desired images;
- be able to find a precise piece of visual information;
- compare images of the same theme or topic;

At the same time, library staff wish the new system to:

- be able to preserve images in a durable format;
- minimize the time in re-shelving slides and looking for missing ones;
- be able to update and expand the information content of an individual slide.

A low cost solution is to use an image card. Images are captured through a video-camera, then the image card will process the in-coming signal and store digitized image files onto a computer hard-disc. These images can be displayed on a VGA monitor. Although the prices of image cards are relatively cheap, about US$1,000, the disadvantage is that they cannot offer high quality images. Moreover, one megabyte of disc space is required to store a colour image. In other words, less than 50 images can be saved in an ordinary 40 megabyte hard-disc!

Another solution is to store images on a videodisc. In fact, some famous museums have been publishing their collections on videodisc format, e.g. the National Gallery of Art (Washington, DC) and the Louvre Museum. The latter has released three videodiscs on painting, sculpture and antiques. The advantage of storing image on a videodisc is that up to 54,000 images can be put on one side of a 30 cm optical disc. These images can be accessed randomly through a host computer.

Again, there are two ways to put images on a videodisc. The first method is to use a video-camera, preferably a high quality beta-camera, to take images. The finished tape is then converted into a 1" professional broadcasting tape for final manufacturing of a videodisc. The second method is to use a sophisticated but expensive videodisc recorder and write images directly onto a WORM optical disc. One image is exactly equal to one frame on the disc. The latter method was adopted as the Sony Company generously lent us one such machine this summer.

A high quality beta-camera is borrowed from the Educational Technology Unit, another central supportive unit of the Polytechnic, to input image signals (PAL) to the recorder. A maximum of 1,000 images can be captured in a day if a few adjustments in image size and colour balance are required. At the same time, a computer is used to record both the slide call number and the frame of the image on disc. After all images are captured, the catalogue data will be copied from the library main system to the image database.

We are going to transfer 20,000 slides from our own production, i.e. the Hong Kong Collection and another 20,000 for which we have obtained the copyright, onto the videodisc. We received positive responses from more than 30 commercial suppliers and art museums which granted us permission to copy their slide images onto a videodisc on condition that it will be used for educational purposes rather than for sale.

We started to transfer images onto the WORM disc in late July. The job will be completed by October 1991 when all 40,000 images are put onto two WORM discs. Then, these discs will be re-casted into an ordinary CAV videodisc. A consultancy firm is employed to provide technical advice and develop retrieval software on a 386 personal computer. A workstation for the image database will comprise a touch-screen monitor, a videodisc player and a host computer. In the future, users can comfortably locate visual images by entering keywords and combining them by Boolean operators. Relevant images will be immediately shown on the screen so that users need not search at the file cabinets or at the slide set shelves. Colour images can be obtained by using a video-printer.[4]

Conclusion

The Library always recognizes and actively responds to users' needs for visual images. Over the years, a vast quantity of slides, covering a wide range of topics, have been collected. Sophisticated equipment is acquired for use in the slide collection. Computer technology is also extensively used in the management of slides.

In meeting our users' needs, we believe that not only must we increase the volume of slides and include more topics of interest, but also enhance the quality of service. In the future, searching and viewing slides will be integrated into a single process in an image database.

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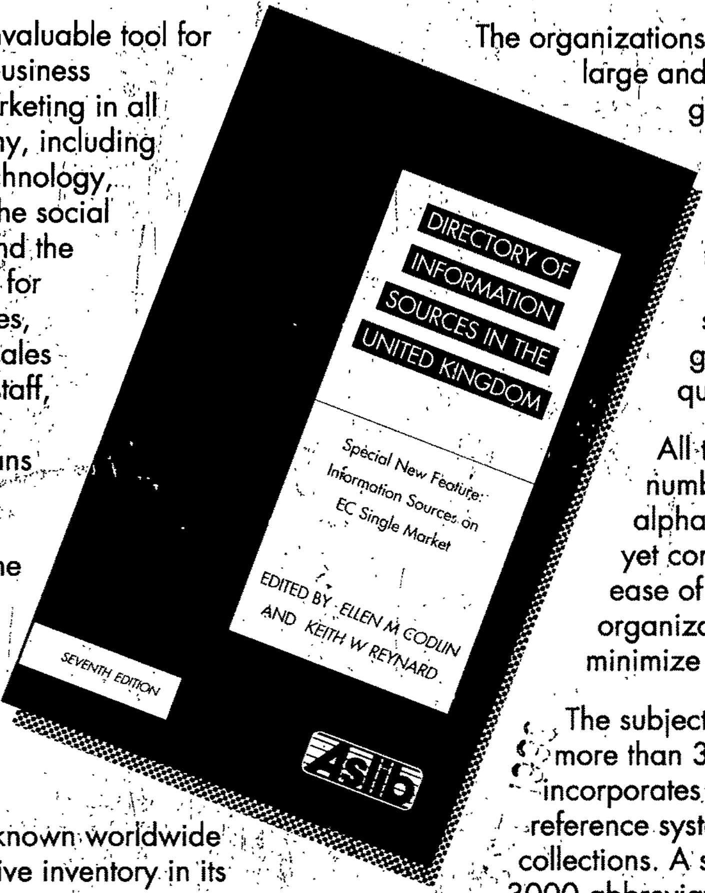
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